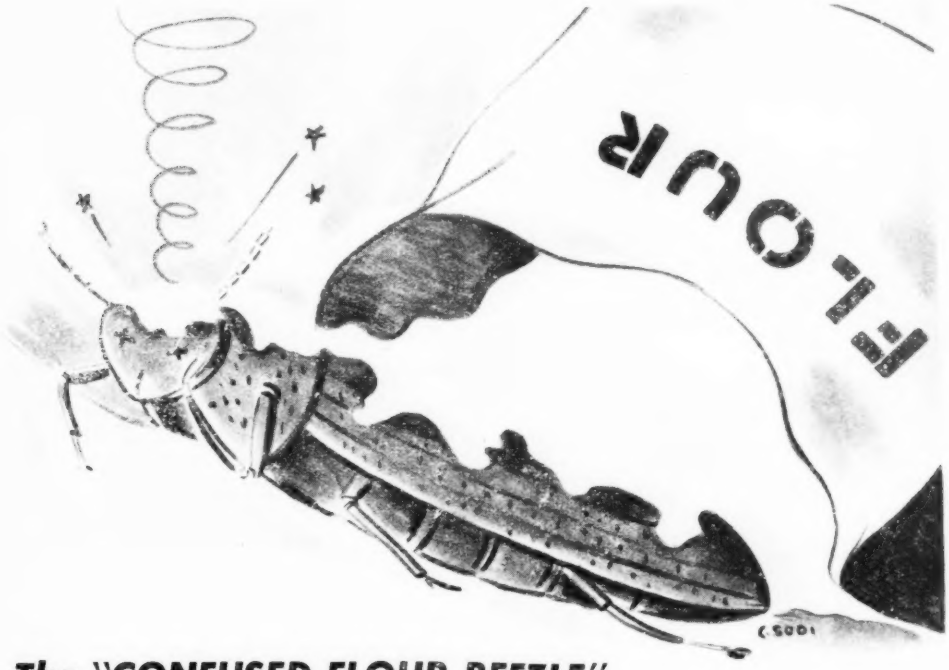
Pests

AND THEIR CONTROL

1942
MARCH
VOL. 10 NO. 3

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.



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to
ALL EMPLOYERS

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Pests

and Their **CONTROL**

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

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EDITORIAL

Pest Control vs. Hirohito, Hitler, et al.

IN HIS book "Fatal Partners, War and Disease," Dr. Ralph H. Major, University of Kansas, outlines how the diseases of typhus and bubonic plague have turned the course of battles and campaigns, including Napoleon's ill-fated trip to Moscow and altered history and geography through the ages. A February news headline which confirms in caps the augury inherent in Dr. Major's thesis, reads: "RODENTS INFECTED WITH BUBONIC PLAGUE HAVE BEEN FOUND ON MILITARY RESERVATIONS IN THE U. S. Recent establishment, therefore, of the Combined Chiefs of Staff Group" of the United Nations in the Public Health Building, Washington, opposite the War Dept., is a fortuitous though timely symbol, if nothing else, of the indivisibility of pest control—a powerful weapon in the arsenal of the battle for the preservation of public health—and prosecution of the war to its only thinkable end.

In spite of the attested fact that wars have been lost, in a measure, because of disease made rampant by pests among the armed and civilian populations; and lost, in a measure, because of food depletions brought about through uncontrolled infestation, the truth is that there is a tendency in some well-placed quarters to improperly evaluate the importance of the P.C.I. This has been evidenced by failure of these quarters to recognize the basic necessity of allotting to the Industry adequate supplies of raw materials, thus enabling it to make its contribution at one with the war's exigencies.

The fallacy of this attitude and ways in which to help ameliorate its ill-effects find expression in the ensuing headlines ad quote-lines from the press and other well-informed sources:

From New York World-Telegram:

Dr. J. W. Mountin, assistant surgeon general of the U. S. Health Service, told the appropriations subcommittee in requesting a $50,000 deficiency appropriation for plague (bubonic) control, that the principal reservoir of infestation is rodents in the western part of the country, especially ground squirrels.

From New York Herald-Tribune:

TYPHUS PLAGUES MADRID

From New York World-Telegram:

NAZIS ADMIT TYPHUS HAS REACHED REICH

From W. B. Courtney's article "Shadow Over Hawaii," Collier's:

There is a Japanese fighter more dangerous to Hawaii than Japanese ships and planes. It is the large land snail Achatina fulica, which is known in Hawaii as the Japanese snail. It was smuggled into the Islands from Japan by Japanese residents of Hawaii. It is the strongest, meanest, hardiest of the vast army of insect pests that we are fighting in order to save Hawaii from starvation and her military defenses from ineffectiveness.

Annually in the U. S. more than $189,000,000 in damage is done by rats. Enough food is eaten or fouled to feed several hundred regiments of husky soldiers for a full year, and cause or transmit at least six dangerous diseases.

From Boston-Herald:

Typhus is reportedly on the march in that vast, unhappy area between the Baltic and Black Seas, where for over two years, now, armies have been marching, counter-marching and generally making unclean the places people live.

From a California newspaper:

In the first World War, according to Prof. Wm. H. Herms, it was estimated that in some wheat deposits as much as 40 tons of wheat per day were destroyed by weevil attacks alone.

From N.P.C.A. Service Letter No. 240:

PESTS and PEOPLE: Perhaps it would not be at all untimely to send copies of this booklet to your local Defense Boards, particularly to the members of the Tire Rationing Boards. We take too much for granted at times as to the "essential" industry we consider ourselves to be. PESTS and PEOPLE is one step that should bring us nearer to that picture of being "essential."

From W. J. Zick's talk "Sanitary Products," at the December, 1941, N.A.I.D.M Convention:

Insecticides are generally thought of as fly sprays and apparently the priorities division of OPM is of the same opinion. Fly sprays on first thought give no indication of their importance to the health of the people.

Some organized and constructive method of doing an intelligent educational job is necessary—not to expand our industry—but to protect it and to prevent its possible destruction by uninformed officials who have never heard of our products or have never been told how important they are to the health and well-being of the nation . . .

The aid of the U. S. Public Health Service should be enlisted and your senators and Representatives should be included on the list of people who must be informed of the products (and services rendered by PCOs—Ed.) you make and their importance to national health. We have a real story to tell and the facts to back up our story, but we have kept it almost a secret. We have not done the educational job of which we are capable . . . Let's protect our industry with an educational campaign emphasizing its important function in protecting public health, and not save our story until after we have been forced to shut down.

May we heavily underline the counsel contained in the N.P.C.A. and Zick excerpts just preceding of the prime necessity for doing an educational job with Defense Boards, Senators and Representatives—who by all means should also receive copies of PESTS and PEOPLE—and the U. S. Public Health Service. In conformity with this fact and in the light of knowledge apparent after-the-war-event, it would seem as if the N.P.C.A. did some split-second timing in getting off to a good running start by exhibiting at the American Public Health Association meeting at Atlantic City, October, 1941, where and when the N.P.C.A. distributed over 3,500 copies of PESTS and PEOPLE to public health and related officials. This is not to say complacency is the order of the day—quite to the contrary. So let's get on with the job.

Use of Oil-Absorbing Fillers With Sodium Fluoride Preferred in Roach Control Work

AFTER the research material "FACTORS INFLUENCING THE ABSORPTION OF SODIUM FLUORIDE BY THE AMERICAN COCKROACH," by George L. Hockenyos, was published in August, 1941, PESTS (reprinted from Journal of Economic Entomology) some PCOs attempted to make practical use of the observations recorded therein, of which the mixture of hydrated lime with sodium fluoride was one. In this connection a number of hypotheses have arisen; they follow: 1. That since the formula CaOH + NaFl — NaOH (Common Lye) + CaFl (an inactive—insoluble) produces lye as one of its substances, is it correct to assume the lye to be the effective roach killing agent? 2. If so, may not its production and use in this manner predispose towards overlooking the customary preventive measures—such as are employed where plain lye is used—to obviate possible burns, eye injuries, or material burns if it becomes wet? 3. Granted the answers to one and two are in the affirmative, would it not be more logical then to use plain lye where its need is indicated instead of in formula abovementioned? 4. That lye acts as a wetting agent and so makes the fluoride more active.

Consultation with Mr. Hockenyos concerning these hypotheses discloses the mixture kills roaches much more quickly than lye; that the caustic is not the effective ingredient in the roach control process; and the supposition that the lye acts as a wetting agent and so makes the fluoride more active does not hold water (nor spread water) as wetting agents were tried with fluoride at the time the work was being done on lime. The reason for not continuing to use the mixture was due to the fact that it had so very short an effective life after application. Therefore, because it is not a practical combination; and because it is very irritating, it is **not** recommended. Instead a fluoride-pyrophyllite combination (more on this in a moment) has been found more effective and less objectionable to handle. Moreover, he points out, the practical outcome of his research—which was a purely scientific work undertaken to explain observed phenomena originally made by Flint and McCauley — revealed that oil-absorbing fillers to extend sodium fluoride are to be preferred in roach control work, with pyrophyllite in actual practice, found to be the best suited for the purpose. From tests in actual practice extending over a period of two years, it appears the use of 25 per cent pyrophyllite actually improves the fluoride, with usages up to 50 per cent pyrophyllite not appreciably reducing the effectiveness of the fluoride.

American Red Cross has sent China two tons of Cyanogas in powder form to poison rats and fleas that are spreading plague.

—*Science News Letter.*

Sabotage Control

ALL segments of industry—from those engaged in the production of all-essential war materials to those in the production of necessitous consumers goods —are serviced by pest control firms. This means pest control service personnel, in the performance of their duties, enter in or upon these properties carrying in their possession poisonous gases, inflammable liquids, and chemical poisons. This in turn creates the chance, and opportunity for the potential saboteur — if any such exists in the industry—to achieve his destructive objectives. For that reason reprint is made elsewhere in this issue of an important bulletin issued by The Employers' Association of Chicago, 35 East Wacker Drive, Chicago, Ill., headed "YOUR RESPONSIBILITY AS AN EMPLOYER IN AMERICA'S WAR EMERGENCY," which describes effective guards to combat this ever present menace to our national security. You are urged to read it carefully and to act accordingly.

Harry B. Weiss, New Brunswick, N. J., War-Time President, American Association of Economic Entomologists

WITH the United States destined to be the major granary for the United Nations, the capital importance of entomology in fructifying this program was never more apparent nor more vital than it is today. The recent election, therefore, of Harry B. Weiss—entomologist of many years standing, research student, writer of numerous tracts and books on insect food habits, ecology and life history, agricultural statistics, economics and History of Entomology—to the key post of President of the American Association of Economic Entomologists is an earnest —if any is needed—that the high standards of the Association will continue to prevail, and that everything entomology can do in the present world crisis will be done.

Of particular interest is Mr. Weiss' life-long entomological background, which includes such posts, among others, as: Chief Inspector, N. J. Dept. of Agriculture; Chief, Bureau of Statistics and Inspection; Chief, Bureau of Plant Industry; and, such honorary offices, as: Secretary, Eastern Branch, American Association of Economic Entomologists; Associate Editor, Journal of Economic Entomology; Vice-President and President, respectively, New York Entomological Society; and Editor, Journal of Economic Entomology.

Congratulations to Mr. Weiss on his election; and congratulations to the Association on its superb choice. There is no question that President Weiss and the Association, conscious of their trust and its potential in the war, will continue to contribute materially in rendering null and void the phrase "too little and too late"—where the production of foodstuffs is concerned.

To Tip or Not to Tip: That Is the Question . . .

WARM of heart, generous of purse, and under the nom de plume of "Mrs. Exterminator," a woman writes one of the largest dailies along the eastern seaboard in this vein:

> *"The Voice seems so busy giving space to all the pen warriors that I doubt if it will print this kind word for the poor exterminator. He is mankind's best friend, secretive and cooperative with all, and thoroughly honest. But does anyone give a darn, and does anyone ever think to give the poor exterminator a tip after his indispensable courtesies?"*

Pest-beset and tired of it all, a certain Mr. Swenson takes sharp dissent from "Mrs. Exterminator's" appreciative nod to the industry as per letter in the same newspaper quoted here:

> *"The only tip the exterminator should get, Mrs. Exterminator, is a swift tip on the chin. Everytime he is exterminating the roaches in the apartment building where I live, my apartment becomes alive with the little beasts. He merely chases them from one apartment to another."*

Thus, while the chips and tips fall where they may, may we, in the guise of an innocent though not uninterested bystander, throw out a couple of tips on our own. The first to Mrs. Exterminator: Commendable as her impulse was, there seems no more reason to tip a PCO than there would be to tip a doctor, dentist, or any other individual rendering a professional service. The second to Mr. Swenson: We are sure a change to a competent PCO will speedily change his views anent the efficiency of PCOs.

The Rush Job

I am a rush job. I belong to no age, for men have always hurried. I prod all human endeavor. Men believe me necessary—but falsely. I rush today because I was not planned yesterday. I demand excessive energy and concentration. I override obstacles, but at great expense. I illustrate the old saying "haste makes waste." My path is strewn with the evils of overtime, mistakes and disappointments. Accuracy and quality give way to speed. Ruthlessly I rush on. **I AM A RUSH JOB.**

—Courtesy Associated Pest Control News, February 2, 1942.

NOTICE!!!

We have not authorized any agents to solicit **renewal** subscriptions. If you are a subscriber to PESTS please send your renewal directly to us.

If you are not a subscriber, subscription may be given to an agent or sent directly to us.

Not a Dry Eye in State House on Governor's Birthday

SAYS the Chicago Daily News: "The occasion of the 45th birthday anniversary of Illinois' Governor Green produced a number of exciting happenings at the Springfield State House, of which a gas attack on starlings that sought refuge in the high dome of the building during the cold wave was the high light.

Charles Mulloy, superintendent of the building, set off a flood of sulphur fumes to drive the birds out of the dome. There was trouble because sulphur is heavier than air.

The fumes floated through the building and made state workers unhappier than they were when their pay was stopped last month. They walked about with handkerchiefs over their eyes and noses, and sniffed, wheezed and wept. Finally doors were opened to clear the air. The sulphur blitz did send the starlings outside to shiver, however."

Before signing off, we must get this commercial in: The next time Superintendent Mulloy is confronted with a bird or other pest situation, we'll make an affidavit that if he will consult a competent PCO before he attempts to give the birds the "hot-foot" by loosing another all-out gas attack, Mr. Mulloy will kill two birds with one stone, namely: Solve the problem of his bird or other uninvited guests; save wear and tear on many tear ducts; and perhaps, avoid the contingency of something not so humorous.

The First Papermakers

The common wasp which makes big, ball-like nests in the trees was the first papermaker. For hundreds of years men have experimented in making paper, using various materials but have come back, for most paper requirements, to the very same material the wasp uses—wood pulp.

The first men to make paper were the Chinese—it was so many years ago that historians cannot set a definite date.

Arabs and Moors plundering Chinese Turkestan brought back captives, some of whom were papermakers and, as the Moslem law provided that they might win their freedom by working at their trade, papermaking became known outside of China.

Then the Crusaders came marching and the secrets of papermaking moved farther west. Papermills were established in Spain, Italty, France, Switzerland, Holland—and finally in England.

It was not until 1690 that the first papermill was established in America, near Philadelphia. Today in this country statistics show that the average citizen uses, in one way or another, over 226 pounds of paper per year. This totals twice as much poundage as the meat he consumes and indicates the giant proportions to which the paper industry has grown.

"Good will, like a good name is won by many acts—and lost by one."

Fourth Annual Southern PCO Conference

POSSIBLY the best summary of the successful Fourth Annual PCO Conference held at Louisiana State University January 26-27-28 would be to quote verbatim from splendid newspaper publicity that not only appeared in local papers but also over Associated Press wires. Many columns were given over to the Conference program.

PCOc Have Big Role to Play for Well Being of Armed Forces

"That the nation's pest control operators will be called upon to play a role vital to the well-being of the armed forces, especially where large numbers of men are congregated in small areas, was pointed out at the fourth annual conference of southern pest control operators which opened this morning at Louisiana State university. The conference, which is attended by operators from almost all southern states, will continue through Wednesday, and is sponsored by the university in co-operation with the National Pest Control Association and the Pest Control Operators of Louisiana.

The part of the pest control operator in the national emergency will be stressed in several sessions of the conference, it was pointed out by O. W. Rosewall, professor of entomology at L. S. U., chairman of the conference.

Big Role in Emergency

This morning W. E. Anderson, state entomologist, spoke on the "tremendous job" which the southern pest control operators face in the national emergency and the advantages which it will give them as a group to attain full professional status and to cooperate in solving regional and national pest control problems. Mr. Rosewall spoke on the need for a southern pest control operators association aside from the Cotton States Association."

Dean Frey Welcomes PCOs

"Dean Fred C. Frey of the University made the address of welcome, extending the greetings of President Campbell B. Hodges and stressing the importance of the conference as one of the university's service to this region. The response was given by P. Calvert Cissel, New York City, president of the National Pest Control Association.

Mosquito Control

W. W. Mirth, assistant in the biology department at Louisiana Polytechnic institute, discussed problems of mosquito control and public welfare at this morning's conference.

Mr. Wirth cited the fact that, despite mosquito control, malaria still causes more economic loss than any other single disease. He also discussed the mosquito in relation to yellow fever epidemics, sleeping sickness, tularemia, and other diseases. He outlined in detail the biology and the best methods of control of the most common disease-carrying mosquitoes and cited some insecticides of efficiency in controlling this pest."

Destroy Rodents to Guard Health, Urges Buettner

Baton Rouge, La.—War brings danger of pestilence and citizens were advised today to help guard against disease by destroying all germ-bearing rodents.

William O. Buettner, secretary of the National Pest Control Association, told a conference of pest control operators here that the Association had pledged its efforts to curtail pest population in war time. At the same time, he said, individuals could help.

Buettner advocated keeping premises clean and blocking off and eliminating hiding places of pests. Trapping also was urged but Buettner warned against use of poisons without expert guidance.

"It is impossible to overestimate the importance of pest control to public health under war conditions," he said.

Legislation

"Torbert Slack of Lake Charles led the discussion and gave a review of the state laws now existing. He pointed out that at this point legislation was not so important as education, and that recognition of certain professional standards, the avoiding of "high pressure" and guarantees, and the observance of professional ethics would do more to raise the practice of pest control to full professional standards than legislation.

Harry D. Wilson, commissioner of agriculture, presided and pledged the full cooperation of the state department of agriculture in promulgation of the existing statute and in support of pest control as a public enterprise."

Termite Control

A "triple threat" program of termite control was outlined at the morning session by Dr. Thomas E. Snyder, senior entomologist with the Bureau of Entomology and Plant Quarantine in New Orleans, at yesterday morning's session.

The national association, by co-operation with regional groups, has been able to obtain a fundamental basis for termite control, called the 1-2-3-3 ½ system, which has been accepted for all parts of the country, Dr. Snyder said.

He outlined the principles of subterranean termite control, stressing the importance of breaking the connection between wood-cellulose on one hand and soil-moisture on the other.

He outlined the steps in termite control as structural modifications to break contact between wood and soil, the use of soil poisons, drilling to effect a chemical barrier in voids and spaces in masonry, and flooding with chemicals where structural changes are impractical.

W. B. Hill, head of a large Memphis extermination firm, spoke on "How I Do a Termite Job."

Research

"Mr. Buettner spoke on the need for research by university and other impartial agencies to fill a national need for wider and more intensive study of the problem of household and structural pests. He outlined legislation in Congress designed to provide adequate appropriations for pest control research and work, and urged the public to take an interest in seeing that the government provides for this branch of service."

Control of Pests Seen as Second Line of Defense

Control of common pests is the "second line of defense in public health," William O. Buettner, Secretary of the National Pest Control Association, told Southern pest control operators at their fourth annual conference at Louisiana State university which opened Monday and will continue through Wednesday.

"It is essential that the pest control experts play their part in war service," Mr. Buettner told a group representing eight Southern states. "We are this war's 'Pest Control Expeditionary Forces.' We are just as much a part of this war effort as if we were commissioned as the 'Pest Control Flying Squadron' or the 'Typhus Control Commandoes.' We will not seek 'exemption' from anything.

"As the storing of vast quantities of food commodities for war emergency use and the crowding of housing conditions in war industrial areas create new problems, the pest control operators must be ready to cope with them. Also the war department will need the service of trained men in training camps.

"The National Pest Control Association has pledged itself to perform any service or duty that the government may assign it, In the meanwhile, our job is one of co-operation as individuals."

Rat Eradication

Mr. Buettner placed special emphasis on the importance of a rat eradication program in wartime. Due to the increased danger of pestilence in war, a three-fold program of sanitation, rat-proofing, and expert extermination should be carried out, he stated. In sanitation, the citizen can do his part by keeping his premises clean, and in rat-proofing by "blocking out" the pests and eliminating hiding places. In baiting or trapping rats, the individual can do his part in insuring the community against typhus, but in gaseous extermination and in the use of poisons, care and experience are required, he pointed out.

"It is impossible to overemphasize the importance of pest control to public health under war conditions," he said.

Many others took part in the program and among those whose names have not been mentioned thus far are: Dr. J. H. Roberts, who conducted the laboratory section; E. R. Barber, L. S. Bridges, Louis Kotler, Joseph Mandelbaum, John Hogan, M. B. Christian, C. W. Edgerton and P. Calvert Cissel.

Fumigation Safety Measures

By E. R. HULBIRT, *American Cyanamid & Chemical Corporation, Azusa, California.*

EDITOR'S NOTE: *The following address was delivered by Mr. Hulbirt before the Ninth Annual Convention of the National Pest Control Association at San Francisco, Calif., October 29, 1941.*

INSECTS have undoubtedly been a source of discomfort and economic loss to mankind from the advent of the first intelligent being down to the present time. Rodents have also destroyed enormous quantities of food and have been the cause of disease and human suffering. Control of these pests has been achieved in recent years largely by the process of fumigation. (This is the process of creating and maintaining a concentration of toxic gas in the space inhabited by the insects or rodents, thus causing their destruction.) A vast amount of fumigation work has been carried out safely without unusual incident. Obviously, the properties which make any material valuable for the destruction of pests, also make it dangerous to human life unless intelligent care is exercised in handling and applying it. Sufficient care to prevent accidents has not always been exercised, with the result that fatalities have occurred.

For this reason, it seems appropriate to discuss quite frankly before this group some of the factors contributing to the situation. (While a large part of our discussion will apply particularly to hydrocyanic acid since this is the fumigant in most general use, still most of what we shall say will apply equally well to fumigation with any other toxic gas.)

At the present time, fumigation with hydrocyanic acid gas is generally accomplished by the use of one of the four following materials; liquid hydrocyanic acid, sodium cyanide, ZYKLON Discoids and CYANOGAS. (Liquid hydrocyanic acid is the commercially pure product which contains 96 to 98% of actual HCN. This liquid boils at about 79° F., but volatilizes readily at all temperatures. It is used by simply atomizing or volatilizing a suitable amount of the liquid in the atmosphere of the space to be fumigated to give the desired gas concentration. Sodium cyanide interacts with sulphuric acid to evolve hydrocyanic acid gas. Fumigation with sodium cyanide is accomplished by allowing the chemical reaction with sulphuric acid to occur in a suitable container within the space to be fumigated, or in some special device from which the generated hydrocyanic acid gas is conducted into that space. ZYKLON Discoids are inert cellulose discs in which liquid hydrocyanic acid has been absorbed. To make use of the discs, they are merely scattered around. The hydrocyanic acid which they contain evaporates rapidly into the air and creates the desired concentration of the poisonous gas. CYANOGAS is calcium cyanide which, on exposure to the air, interacts chemically with the moisture present in the air and liberates hydrocyanic acid gas. CYANOGAS may be scattered about on the floor or blown as a dust into the space to be fumigated.) Regardless of which one of the four methods is used, the fumigant, hydrocyanic acid gas, is the same in each case and the same general care must be used in conducting the fumigation.

A careful analysis of fumigation accidents which have occurred reveals that in most cases the accidents could and should have been prevented. It is not my intention to go into the details of these accidents nor to attempt to fix the responsibility in any particular case, but in general if all of our available information pertaining to the fumigant had been utilized and the details of the fumigation procedure carried out in accordance with recognized best practice, it is certain that by far the largest percentage of the accidents of record would not have occurred.

Ninety percent of the accidents may be classified in four groups. A large number have arisen from the practice of fumigating a room or a part of a building without completely vacating the remainder of the building. Other accidents have occurred because of inadequate guarding of premises under fumigation. Still another group may be attributed to lack of care in preparation of the places to be fumigated and in the omission of some small but important details of the usual fumigation procedure. Failure of the operators to always protect themselves with perfect gas masks provides another important cause of accidents.

In a tabulation of fumigation casualties compiled for a period of two years, the percentages of accidents assigned to various causes were as follows:

Cause of Casualties	Percentage of Casualties
Failure to vacate entire building while only part was fumigated	20%
Failure to make personal inspection of entire premises immediately before releasing gas	8%
Failure to lock all doors and accessible windows, placing warning signs thereon, and to guard premises adequately during fumigation	25%
Failure to beat all mattresses, pillows, bedding, clothing and bedroom rugs, and to test for presence of HCN before allowing tenants to use	25%
Failure to always wear a gas mask in perfect condition	20%

After thorough study of all the factors and conditions involved in practical fumigation work, the Fumigation Committee of the National Pest Control Association presented a report embodying a series of recommendations covering fumigation practice. This report with its recommendations was unanimously adopted as the policy of the National Pest Control Association on October 30, 1940. (We want to commend the Committee for its careful and complete analysis of problems confronting the pest control operators, and for its clear, concise and reasonable statement of necessary details of procedure.) We have no doubt but that a strict compliance with the recommendations set forth by this Committee would prevent in the future most of such fumigation accidents as have occurred in the past.

We realize that the idea of vacating any building completely while any portion of it is undergoing fumigation, is a controversial point. We have listened to many arguments in opposition to this idea. Arguments come from both the property owner and from the pest control operator. For example, an apartment house owner

thinks that such a requirement would cause undue inconvenience to his tenants and would probably give undesirable publicity to the fact that his premises were infested with pests, while the fumigator considers complete evacuation of such an apartment house unnecessary. These are just typical arguments. While we will agree that some of the objections to this requirement are logical, at the same time we cannot overlook the fact that the usual procedure of merely vacating rooms adjacent to, and above and below the ones being fumigated, has not been adequate in preventing accident. This is the reason for recommendation No. 4 of your committee, viz. that "no partial fumigation of any building be allowed unless the entire structure be vacated."

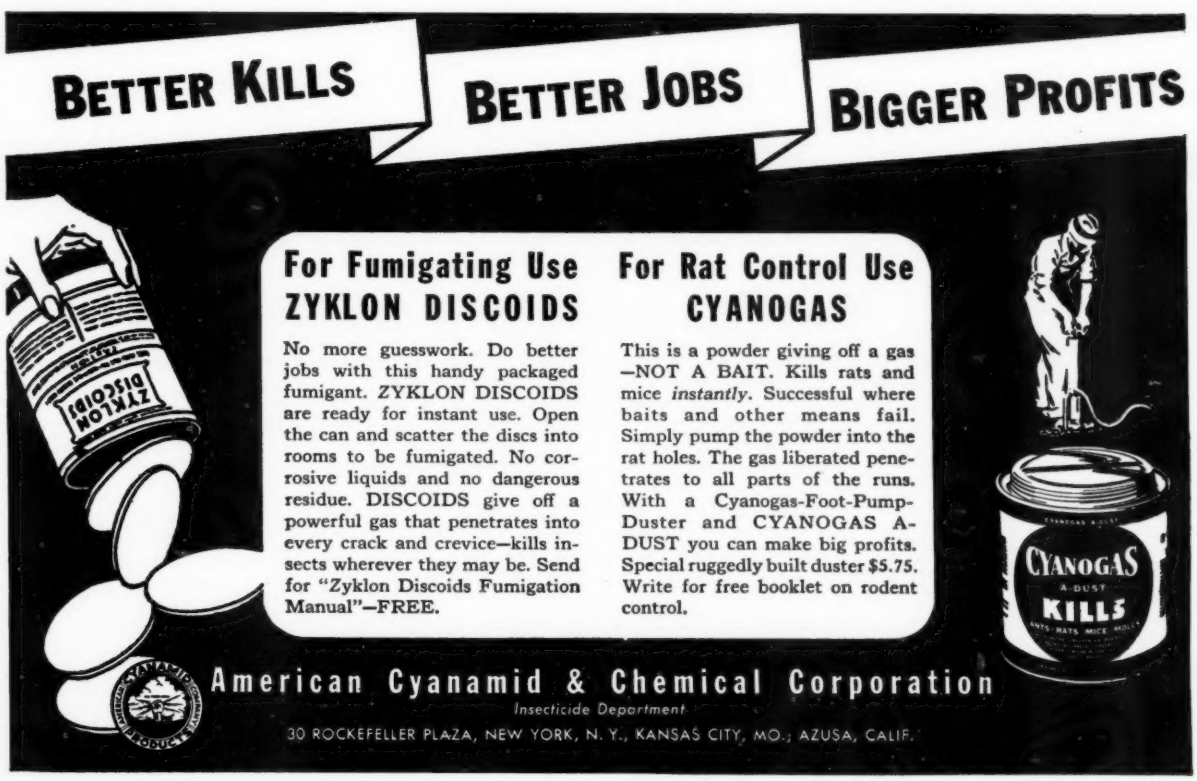
Strenuous objection has been offered by the fumigators to the proposition of stationing guards outside of premises undergoing fumigation. The item of cost is the main consideration. Fumigators argue that the regular use of guards would increase the cost of most jobs materially and in some instances, especially small jobs, the cost would be prohibitive. Facts remain that, if this requirement had been observed, in all probability several fatalities would not have occurred. To prevent accidents to persons who might in any manner secure access to premises being fumigated, recommendation Number 5 was formulated. It states "On every job one or more watchmen be on guard outside the fumigated structure during the entire period from the time of the fumigation until it is safe for experienced fumigators to enter without masks."

It should hardly be necessary here to emphasize the importance of the utmost care on the part of the fumigator in making preparations for a fumigation and yet lack of attention to such details can be credited with some of the fatal fumigation accidents in the past. Lack of adequate aeration of the contents of a fumigated room, bedding in particular, has been another cause of accidents. A number of the recommendations in the list are concerned with promoting greater care in the details of the work both in the premises to be fumigated and in the preparation for reoccupancy following the fumigation.

It is important that accidents be prevented among the fumigators and their crews as well as among other persons. Gas masks in first class condition are indispensable necessities for safe practice. They should not only be available but should be worn. We cannot emphasize this point too strongly since the tabulation of causes of fumigation accidents shows such a large percentage due to failure to wear gas masks that afford adequate protection. Your Committee considered the matter of gas masks so important that their number one recommendation was that "no crew be allowed to fumigate unless they are properly equipped with gas masks approved by the U. S. Bureau of Mines and which have been properly tested before entering into the gas."

While gas masks with suitable canisters give respiratory protection in such gaseous atmosphere as may be produced in regular fumigations, the fact should not be over-looked that it is not safe for operators to remain in such gas concentrations, even with masks functioning perfectly, for more than a few minutes due to absorption of the gas through the skin of the body. Hence, all procedures should be arranged so that the operator will be exposed for the least possible time to the smallest possible gas concentrations.

We are in entire agreement with your fumigation committee that there is great need for emphasis on precautions for preventing fumigation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accidents. We also agree with them that it is desirable to keep the legal regulations down to a minimum because it is difficult to achieve morality and ethical practices by such legislation. It was on this basis that your fumigation committee drafted the recommendations for fumigation practice. We would again emphasize the important work which that Committee accomplished and urge your support of their efforts by voluntarily complying with their recommendations.

When fumigation accidents occur, they are generally serious and frequently fatal. They result in much undesirable publicity for the pest control business, and particularly for the operators involved. These accidents are also a source of considerable expense either directly or indirectly. They are frequently the cause for enactment of stringent laws and ordinances governing fumigating licensing and operation. As an example, Assembly Bill No. 96 in Nevada was passed and became law this last spring. This law imposes very strict regulations upon fumigation, and was the direct outcome of a fumigation accident which occurred in that State resulting in the death of three persons. Some of the larger cities of the country have enacted ordinances governing pest control operations which severely limit such operations. These considerations are important, but, of course, distinctly secondary to the main consideration, that of preventing loss of human life.

One of the essentials for all operators who do fumigation work is a thorough knowledge of first aid procedure in a case of cyanide poisoning. It is a well recognized fact that first aid treatment administered during the first few minutes following a cyanide accident, before a physician can arrive at the scene, is highly important in determining the outcome of the case. Delay in providing suitable first aid as well as wrong procedure, may be the cause of fatalities. All persons connected with fumigation operations, including operators and helpers should be proficient in the Schaeffer prone pressure method of artificial respiration. The ability to apply this method at once and efficiently may mean the difference in the outcome of a case of poisoning between quick recovery and death.

In an accident where someone is overcome by hydrocyanic acid gas, the services of a physician should be secured without delay but immediate and continued first aid should not be neglected. Someone else should be delegated to call the doctor. The steps to follow in caring for the case before the arrival of a physician are few and simple and yet very important. The first step is to remove the victim of the accident to fresh air, free from the fumes which caused his collapse, in the quickest possible time. Fresh air does not mean out of doors in cold weather. The patient should be kept warm. At all times it should be remembered that a human being is involved and he should be carefully handled. He should lie on his side or stomach, not on his back. If he is breathing, he should inhale strong ammonia fumes. Amyl nitrite is sometimes used in place of ammonia for inhalation. Amyl nitrite is a powerful drug and care must be used not to give too much of it. If conscious, he should not be permitted to exert himself. If he is not breathing or if his breathing is inadequate, then artificial respiration by the prone pressure method should be started at once and continued without interruption until the arrival of the physician. When the physician arrives, the case is in his hands.

By following this simple procedure, lives can be saved which might be lost without such first aid assistance. It is a mistake to pick up and transport a victim of a fumigation accident to a physician's office or to a hospital. The physician should be called to the scene of the accident. In the meantime, intelligent first aid until his arrival cannot be overstressed.

These instructions naturally apply chiefly to the men who are carrying out the fumigation work and to accidents which are discovered at the time they occur. Other accidents which are only discovered several hours after they have occurred are generally of the type where the victims are past help. However, we know of one accidnt which occurred during the present year where a man was found in an unconscious condition near a place being fumigated. There was considerable delay in getting him out of the cyanide fumes, and further delay in getting medical assistance. Without doubt, this man would have had far more chance of surviving if the first aid steps just enumerated could have been applied to him.

Warning gases are sometimes advocated as a means of preventing accidents. The theory of warning gases is logical. If some gas could be incorporated in the fumigant which would be obnoxious or irritating enough to prevent anyone from entering the premises so long as there might be any of the gas present, and the warning gas had the same general properties as the fumigant and would last as long as the fumigant and likewise disappear with it, this would be highly desirable. There is one very practical difficulty, and that is that such an ideal warning gas has never been found. On the other hand, dependence upon a warning gas to indicate safe conditions in a fumigated building, with the warning gas failing to accomplish its intended purpose, has led to accidents. In general, warning gases which have been used have introduced hazards in addition to those of the fumigant, both to the operators and to the public.

(There are instances on record where the blinding effects of tear gases have prevented men from getting out of fumigated spaces from which they normally could have escaped by merely holding their breath. Gas masks are not always effective against tear gases. There may be a serious hazard to men carrying on fumigations if they become blinded by tear gas getting through the canister of the gas mask.) To the practical, every-day fumigator, a warning gas is a nuisance and therefore a potential danger.

(Another objection to warning gases is that they may corrode metal objects and decorations in the fumigated space. Warning gases are not suitable for fumigating where foodstuffs may be involved because of the danger of affecting the taste and healthfulness of the foods. It is also known that some of the warning gases which have been used have a cumulative effect on the health of the fumigator who unavoidably inhales small amounts of them in the course of his work. Perhaps the strongest argument against the use of warning gases is that they either air out long before or long after the main fumigant. If the former occurs, a false sense of security is created; if the latter, the process of aeration must be greatly extended with much delay in reaching a safe condition for reoccupancy.) It has been repeatedly demonstrated that when sensible regulations have been observed, fumigation work can be carried on safely without the use of warning gases.

A question is frequently asked with regard to the physiological effects of HCN gas upon persons exposed to it. The general consensus of opinion is that hydrocyanic acid has no cumulative effect and that a person in normal health before being overcome by the gas would, after being revived, recover rapidly to his previous state of health. It is generally agreed that any person in poor health or with organic disease of any kind, should not be engaged in work where he might be exposed to fumes of poisonous gases of any kind. (Hence, it is important that

only healthy individuals be permitted to conduct fumigation work.)

Alcohol and cyanide should not be mixed. An individual who has taken into his system any appreciable amount of alcohol and then exposes himself to cyanide fumes is normally much more susceptible to the effects of the cyanide than he would be without the alcohol. Further, if this same individual should be overcome by cyanide, his recovery would be much more difficult than if his system were free from alcohol. This plainly indicates that no fumigation workman should ever undertake a job where he might be exposed to cyanide fumes after he had taken one or more drinks of liquor.

Fumigation accidents have occurred with a wide variety of attendant circumstances. Details vary in each case. It is reasonably certain that most of these accidents should not have occurred except for carelessness on the part of some one. We realize that it is impossible to change human nature and that carelessness will continue regardless of regulations and laws and in plain disregard of all reason. However, we are of the definite opinion that the incidence of accidents in fumigation work can and should be reduced. A careful conformity to the series of recommendations for good fumigation practice adopted by this Association will go a long way toward preventing such accidents. Unless the pest control operators voluntarily conform to such details of procedure as given in these recommendations, they are certain to find themselves circumscribed by much more rigid and restrictive regulations imposed by law making bodies.

Fumigation is an important sanitary process which can be conducted safely and with much benefit and satisfaction. The destruction of insect and rodent pests contributes materially to the health and happiness of mankind. It is highly desirable that the process be retained free from prohibitive regulations. To that end, we urge the utmost care and forethought in all fumigation work, thus eliminating conditions which have contributed to accidents in the past and aiming at a new record for safety in the future.

Maker of Vermin-Infested Army Bags Sent to Jail

Alex Leitman, manufacturer of camp supplies, was under sentence of ten days in jail and a $500 fine recently because vermin crawled into sleeping bags he was making for the United States Army in Iceland.

Magistrate Hoppin, in Manhattan, sentenced Leitman in spite of his attorney's plea that Leitman was a "reputable business man who has been in this kind of business for more than 40 years."

—*Brooklyn Eagle.*

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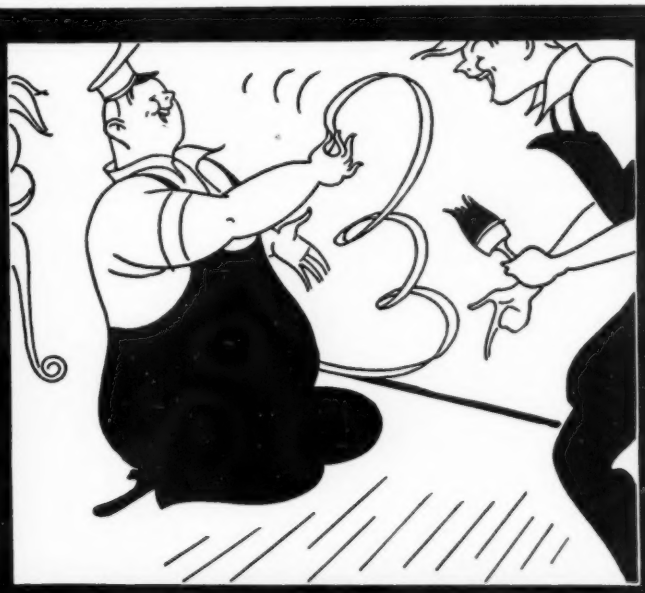

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Your Responsibility as an Employer in America's War Emergency

America is at War!

To win this war will require the total mobilization of every military, industrial and human resource in our country. On the business and industrial front, every employer whether in defense production or not, is in the position of a commanding officer with the vital responsibility of maintaining his organization at top efficiency at all times. What must be achieved, in effect, is a wartime system of business and industrial discipline. The job is simply too enormous to be handled by any one organization, governmental or otherwise—it is up to you as an employer to put into effect and carry out for the duration an emergency system which embodies suitable precautions to insure the continued operation of your organization at 100 per cent of potential efficiency.

No employer should assume that, because his business is not in the direct production of munitions or other first line war materials, that he does not share in wartime responsibility. Enemy espionage and sabotage activities may be directed through unexpected channels at completely unexpected times. In a social economy as complex as the American system, the success of the present supreme war effort may be seriously endangered by any activities which cause trouble or confusion in any aspect of military, governmental, or civilian affairs. The employer's responsibility is all the more compelling because it is voluntary and not the product of a military-type organization.

The following outline is meant to suggest the methods by which an employer may survey his organization to determine what emergency system is needed. On specific problems not covered completely in this outline, employers may obtain further information by contacting this office.

1. Emergency Personnel Methods

The most important single factor in maintaining full business and industrial efficiency and guarding against espionage and sabotage, is securing the loyal and intelligent support of employees. The necessity and nature of emergency methods should be thoroughly understood by every worker. The job is not to stimulate a hysterical spy hunt, but to apply the sensible methods of business organization to the current national problem.

A. Employee Credentials

All employers should adopt extra precautions in hiring new employees. The reference form should include, in addition to the standard personnel records, the following specific information:

(1) If foreign born, full data on entry into the United States.

(2) Citizenship. For naturalized citizens, determine when and where naturalization papers were obtained.

(3) Names and addresses of employee's immediate family, including relatives of husband or wife, and including close relatives residing in a foreign country.

(4) Military or naval experience, whether United States or with a foreign power.

(5) Organizations to which employee belongs, other than labor unions.

(6) Employee's record during period from 1914 to 1918.

In addition to new employees, the above information should be secured from key employees and, in some cases, from all present employees. Data given should be checked insofar as possible.

B. Fingerprinting Employees

Industrial plants, public utilities, and other businesses vital to the national defense should fingerprint all employees and new applicants for jobs. Fingerprint records should be sent to the Federal Bureau of Investigation to check for criminal records.

C. Check Absent Employees

During the wartime emergency, absentees should be checked to verify the reason for absence. Persons absent without legitimate excuse should be regarded with suspicion.

D. Emergency Rules and Regulations

Special rules for employees, including the precautions against espionage and sabotage, should be furnished to all employees. Applicants for jobs should be required to sign such rules as evidence of familiarity with them. In addition, printed copies of such rules should be conspicuously posted, together with copies of the Federal Espionage and Sabotage Statutes. This office will provide copies of these statutes upon request.

2. Identification System

In order to make other precautions really effective, all vital industries and businesses should adopt an identification system which will be adequate at all times and under all circumstances to prevent unauthorized persons from gaining access to strategic points. Such identification should apply to every individual. The identification should be of a nature impossible to counterfeit and capable of easy recognition. The primary purpose of such identification is to make it possible for every employee, not only guards, watchmen, etc., to prevent unauthorized entry.

Special precautions must be taken to identify authorized visitors, and to make sure that such identification cannot be re-used by unauthorized persons.

3. Special Precautions Against Espionage and Sabotage

Enemy agents may be expected to attack vital American industrial and business front wherever openings are left unguarded. Espionage agents are interested in a wide variety of information, such as production methods, rate and capacity of production, government orders, records of standard or new types of war material or parts thereof. Such agents may work directly or indirectly through employees, in person, or through subterfuges such as alleged commercial concerns, import-export associations, scientific and engineering societies, etc.

Enemy saboteurs may be expected to attempt damage or arson to production and distribution facilities, and to attempt injury by various methods to key personnel.

Employers should survey their facilities and operational techniques to discover all the bottlenecks, points of special vulnerability, and contacts with other organizations which are open to the danger of enemy attack.

A. Confidential Documents

In concerns which work on confidential material, special precautions should be taken. This subject is too detailed to be covered

in this outline, but employers who have need of further information may contact this Association or the local office of the Federal Bureau of Investigation.

B. Mail Handling Safeguards

Careless handling of both incoming and outgoing mail should be safeguarded against by all employers, including concerns which may not deal directly in primary war materials but may have correspondence with firms which do. Mail handling precautions should insure that all outgoing mail is inspected by responsible persons and handled only by trusted clerks who are personally charged with delivery to postal officials.

Incoming mail must be inspected for packages containing explosive, incendiary, or corrosive material, and for suspicious or threatening letters. Precautions should be taken that "Personal and Confidential" mail is opened only by a responsible executive.

C. Precautions Against Entrance or Access to Vulnerable Points

It is particularly important that special thought be given to the proper safeguarding of plant and building entrances such as coal chutes, fire-escapes, skylights, sidewalk elevators, shipping and receiving platforms, storm sewers, and windows facing on streets and alleys. All such points should be adequately protected. In addition, it may be desirable to install floodlighting systems to prevent trespassers from reaching such points unobserved, and suitable interior lighting is recommended when the property is not occupied.

Besides the precautions to prevent entrance, a careful study should be made of all facilities inside the property where damage or theft would be especially harmful. Such points or areas should be given extra protection and be restricted to the properly authorized personnel.

D. Fire Prevention

Rules and regulations covering smoking, handling of inflammable materials, and other standard precautions against fire should be rigidly enforced. Redoubled attention should be given to the facilities and organization within the property for dealing promptly with a fire when it has occurred. Adequate first aid provisions are essential.

E. Guard Systems

At this critical time every employer, both those engaged in defense production and those contributing indirectly to our war effort, should be personally responsible for a thorough study and planning of a guard system which will adequately safeguard against all emergencies. During this period, many organizations will add extra shifts or will make other emergency changes in operation which may render existing guard systems inadequate. It is essential that no effort be spared to prevent either willful or accidental damage to any part of the nation's production or distribution system.

THE EMERGENCY REQUIRES NO IMMEDIATE ACTION

The treacherous nature of the attack upon the United States means that immediate all-out effort will be required of every American to overcome the initial disadvantage. The employers of the country, because of the special knowledge, experience, and facilities, have a responsibility which cannot be delegated or avoided. Each must prepare immediately to meet the responsibility.

The Employers' Association of Chicago is ready and willing to put its services at the disposal of any employer in the Chicago area, whether a member of the Association or not, to aid in establishing a satisfactory emergency system.

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About Stomach Insecticides

By ROY HANSBERRY, *Cornell University, Ithaca, New York*

THE mouthparts of insects are amazingly variable, each kind of insect having special shapes and structures to enable it to meet the different conditions of its eating. There are, however, three general types adapted for (1) piercing and sucking, as in the bedbug, (2) lapping up liquids, as in the housefly, and (3) biting and chewing, as in the cockroach. Insects having the latter type can be poisoned with solid insecticides used as stomach poisons, while those with lapping mouthparts are generally incapable of taking solid food and can be poisoned with stomach insecticides only in liquid form. Only contact insecticides will kill insects with piercing and sucking mouthparts.

There is almost as much variety in digestive systems as in mouthparts, but that of the cockroach will serve as a very general example. Although **the crop** of many insects (the housefly, for instance) serves only as a reservoir for food storage, in the crop of the roach the food is mixed with salivary secretions and some of the digestive secretions of the midgut. Thus digestion actually begins as soon as the food is eaten. Between the crop and the midgut is a gizzard-like organ called **the proventriculus.** The function of this organ is to grind the food to make digestion easier.

In **the midgut** digestion is completed and most of the absorption of the food takes place. The function of this part of the digestive tube in an insect is analagous to that of the stomach and small intestine in man. Just posterior to the proventriculus in the roach are several blind pouches or caeca which secrete digestive solutions into the midgut proper. The cells of the wall of the midgut also secrete digestive enzymes. This is a very sensitive process. In some insects the entire cell breaks open, emptying the contents into the gut. An entirely new lining of the gut may grow in 48 hours in these insects. In other insects the digestive fluids are given off without the destruction of the cells themselves, although if the insect has not fed for several hours, the secretion may be much more violent. It is obvious that the relation of the digestive processes to the cell lining of the midgut is one of the most delicately balanced physiological processes in nature.

At the junction of the midgut and the hindgut, **the Malpighian tubules** empty into the tube. These serve the function filled by the kidneys in higher animals, namely, the elimination of poisonous material from the blood stream. In the insect these substances are normally urea, ammonia, uric acid, and other nitrogenous wastes, together with calcium oxalate and lime. However, when an insect has been poisoned with arsenic or other stomach poisons, it has been shown in some cases at least, that the Malpighian tubules can take up these poisons from the blood and excrete them. They help the insect resist poisoning in this way by eliminating small doses. Some idea of their complexity will be obtained when one knows that in the adult American roach the total absorbing area of the 60 separate tubules is approximately 211 square inches.

The hindgut is the third major division of the digestive tube. Its function is largely to reduce the water content of the food residues, restoring the water to the circulatory system of the insect. A number of specialized rectal glands help in this, although all the cells are pervious to water.

Summarizing, we have seen that the wall of the foregut is impervious to water and digested food, that both digested food and water pass through the wall of the midgut, but that in the hindgut the wall is pervious to water, but not to food. Since the midgut is the most delicately balanced system, due to its dual function of absorbing food and secreting digestive enzymes at the same time, it is apparent that in the digestive tube this is the most sensitive region to the action of stomach insecticides.

Digestion in insects is similar to the chemical processes that occur in humans. The salivary glands secrete amylase and invertase capable of digesting starches and sugar. The digestive enzymes in the midgut depend on the food eaten by the particular species. Thus a general feeder like the roach will secrete protease, lipase, amylase and invertase, capable of digesting respectively, proteins, fats, starches and sugars.

Some of the most interesting specializations in the insect work occur in the digestive processes of those insects which feed on wood. The principal components of wood are lignin, cellulose and starch. Although no insect seems to be capable of digesting lignin, many different insects can digest cellulose. This means that an insect could eat filter paper, turn it into glucose and excrete no residue. Many wood boring beetles digest cellulose by means of the enzyme cellulose. Other insects, notably the termites, have their digestive tubes teeming with a variety of single-celled primitive animals (Flagellates) which digest the cellulose for them without themselves being digested. If the flagellates were killed by poison, the termites would die of starvation.

The powder post beetles cannot digest cellulose and must depend on the starch content of the wood for food. This is the reason for their copious excretion of undigested wood in the form of powder. If wood has been seasoned slowly, particularly if it is heart wood rather than sap wood, very little starch is present and it is immune to attack from this insect.

The silkworm seems to be one of the fastest eaters in the insect world. Food is excreted in 2 to 3 hours after being eaten. The cockroach requires from 9 to 33 hours for the same processes and 2-3 day elapses between feeding and excretion in the clothes moth. In other insects which feed entirely on liquids there may be no emptying of the rectum for long periods. The honeybee, for instance retains its feces all winter, although this reluctance to soil the hive seems to result in some discomfort and even danger to the bees in years with a late spring.

The really efficient saboteur knows the machine thoroughly, since it is only through an intimate knowledge of the parts and the working of the machine that one can tell where a monkey wrench will do the most damage. This discussion of how digestion in a normal insect works has been presented so that you will know where and how it is susceptible to sabotage by poison.

The most delicately balanced mechanism of the whole system is the midgut. It is not surprising, therefore,

to find rather definite and serious effects on its structure and function when caustic poisons come in contact with the delicate tissues of its wall. Both the arsenicals and fluorine compounds have been shown to cause the cells to shrivel and tear loose from the membrane supporting them. Indeed, the cells of the midgut wall seem to have some particular susceptibility to arsenic, since it has been shown that if arsenic is placed on the surface of an American roach it will be absorbed and a large part of it may be recovered from the midgut wall.

Some organic insecticides such as rotenone may act on all the cells of the body in some obscure way which prevents them from respiring normally. When these insecticides enter the body through the digestive system, they may pass through the midgut wall without changing its appearance and travel in the circulating blood to all parts of the body where they will act in precisely the same way as if they entered the body by contact. Nicotine, for instance, kills insects equally rapidly when sprayed onto the surface, or ingested. In these cases it is simply a matter of absorption through the exterior body wall or through the walls of the digestive tube.

Pyrethrum seems not to act efficiently as a stomach poison. There is no reason why the pyrethrins should not be equally lethal administered by mouth if they reached the vital cells as pyrethrins. It seems fair to guess, therefore, that something in the acid or alkaline nature of the gut, or in its digestive enzymes, is capable of destroying the sensitive chemical constitution of pyrethrins, rendering them substantially non-toxic. That this is not a bad guess has been shown by experiments at the federal entomological laboratory at Beltsville, where pyrethrum was fed to larvae of the southern army worm and suspensions of the various tissues were then tested as insecticides against mosquito larvae, which are very susceptible to pyrethrins. It was demonstrated that the nature of the pyrethrins had been changed so that they were no longer toxic.

Some insecticides are not toxic to certain insects because they are not dissolved or absorbed by the midgut. Once an insecticide has passed the midgut, it has no further opportunity to poison the insect. Thus lead arsenate may be recovered almost completly unchanged from the feces of a roach which has ingested it.

It is hoped that in the course of this discussion the point has been made, that while there is much we do not know about the exact nature insecticidal action, if we understand the processes of digestion in the insect's body, and the direction of the fluid movements from the midgut into the blood stream and back to the hindgut by way of the Malpighian tubules, it is possible to understand why some insecticides kill and others do not.

The Trend of Affairs

"Cucaracha"

An intriguing observation in the November '41 Technology Review will readily bear repetition here: "Beneficiaries of blitzkrieg are hard to find, yet at least one living creature is being made happy by Herr Hitler. Demands of greater steel production are diverting more fluorspar to steel mills, to be part of the slag essential to manufacture of the metal. Makers of insecticides also have relied on fluorspar, which can be converted into material for poisons. As supplies are diverted, the cockroach prospers. New York pest exterminators are reported worried."

Comment is hardly necessary, except perhaps, to indicate that thanks to prompt intervention on the part of the N.P.C.A., the worst effects of the fluorspar diversion have been somewhat mitigated, with the result that Herr Cucaracha still has to be very cautious of his diet, or, "or else."

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Some Pertinent Facts and Some Important Theories about Contact Insecticides

By W. C. O'KANE

EDITOR'S NOTE: *The following paper was read by Dr. W. C. O'Kane, State Entomologist of New Hampshire at the Second Eastern Pest Control Operators' Conference held at Massachusetts State College, January 12-13-14, 1942.*

NO one will question the part that facts must play in the manufacture and marketing of an insecticide. They constitute the ultimate and fundamental basis. A material must kill the insect for which it is adapted, and must do whatever else it is supposed to do. It must be safe in the hands of the public, both as regards the man who uses it and as regards the objects on which it is used. It must win and hold the favor of the public. It must legitimately command such price as will yield a reasonable profit. All those matters involve facts, not theories.

But theories also have a place in the manufacture of contact insecticides, because, out of theories come new facts, and thus development of new and better materials. If we do not question and surmise, try and experiment, we shall have nothing better than we now possess. We shall not be able to meet needs that we know exist, nor be ready for situations that we do not now suspect, but are sure to encounter.

So it comes about, I think, that in the manufacture of contact insecticides, as in much else that we do, we need to take account both of facts and of theories. We cannot wisely mistake a theory for a fact, but we can think about theories while we make use of facts. Since the men who are at work in experiment stations and in federal bureaus have time and opportunity to explore theories, it is logical to keep closely in touch with their work, and to maintain contacts with their activities.

There have been several theories as to the way, or the ways, in which a contact insecticide may kill an insect. One of these is no longer considered widely valid. This is the idea that a contact insecticide kills an insect by suffocation. We know now that some effective contact insecticides are not so constituted as to deprive the insect of access to air. We also know that many kinds of insects are able to withstand prolonged periods in which they do not have access to fresh air. They are not like human beings. Many of them at least can survive an astonishingly long period in which they are sealed away from air. Many insects, for example, can survive prolonged immersion in an atmosphere of nitrogen.

We know now that there are several ways in which a contact insecticide may kill an insect. Death may be brought about by any one of these, or by two or more in combination. Known avenues are at least four, as follows:

a. A material may kill an insect by coming in contact with a large number of specialized nerve structures scattered over the insect's body. The mechanism by which death is brought about under such circumstances is not understood, but the fact that it can come about is pretty well established. Since an insect integument is made up of material that is not in the form of sensitive living cells, it is logical and no doubt necessary that an insect have special structures scattered over its body with which to receive impressions or stimuli. If it did not have these it could not react satisfactorily to its environment. Necessarily, all of these are hooked up to the insect's central nervous system. In one way or another these structures are the means by which an insect reacts to heat or cold, to moisture or dryness, to light of varying intensities, to chemical stimuli, to touch, and quite likely to other stimuli.

b. An insect may be killed if a sufficiently potent chemical is brought into contact with even a few vital nerve structures on the surface of its body, or its appendages. In our laboratory we have found that application of a potent chemical to a single joint of an insect's antenna may cause death—provided you select the right joint. Death may be brought about by similar application to a single spot on a single joint of an insect's leg—provided, again, you select the right spot. Of course, in practise, nobody is going to kill insects by applying a chemical to certain spots. But if a chemical of its own act will find these spots as well as others, the application may be quite practical.

c. A material may kill an insect by creeping up its breathing tubes. These tubes have openings through the body walls. The tubes lead everywhere within the insect's body, continually dividing and sub-dividing until they become extremely small and thin-walled. They lead to every vital organ within the insect. They enter the nerve ganglia. If a material carrying a suitable toxicant creeps up these tubes it can carry the toxicant to vital places.

d. Some materials can penetrate through the integument of an insect, especially in regions where the integument is more susceptible to such a process. This ability is not necessarily true of all contact insecticides, and is believed not to be true of some that otherwise are effective. But we know that some liquids can penetrate the integument, and if such a liquid is toxic, or if it contains a toxic substance held in solution, it may, thereby, reach vital organs and cause the insect's death.

The above enumeration of certain ways in which a contact insecticide may kill emphasizes the importance of making swift and complete contact with the insect. Each of the above channels of access depends on the ability to make contact. Each of them is furthered in its performance if contact is easy and swift. Each of them is hindered, or rendered inoperative, if contact is poor. In other words, the physical character of a material, its ability to spread quickly and completely over an insect, or, in brief, its "contact quality," is highly significant. No matter though it be potent it cannot perform to best advantage as a contact insecticide unless it exhibits adequate contact performance. If it does not have this quality it may

fail where otherwise it would succeed.

Since the materials we are considering here are liquids, or are intended to become liquids when used, contact performance involves the relation of a liquid to a solid, which means in this case the relation of a spray material to the surface of an insect. Therefore, we are equally concerned with the nature of the surface of the insect and the nature of the spray material. Neither one alone tells the story. One is X and the other Y, and we need to learn the answer to both X and Y, in order to solve the equation.

When we consider the surface of an insect we run into both facts and theories. It would be highly desirable if there were a larger proportion of fully understood facts, for we do not know many things that we ought to know. We do know that the integument of an insect is a more or less firm structure which in part is made up of secretions from glands, or from active tissues lying beneath the outer surface. It is firm because it serves as the insect's skeleton. Where we have bones within our body the insect has an outer shell. To that shell its muscles are attached. On top of this firm structure there is a very thin coating which possibly has served as a sort of raincoat for the insect down through the ages. This coating is evidently of a waxy nature. But in spite of considerable work that has been done we have only imperfect knowledge as to the chemical nature of the coating. Some investigators thought that they had worked it out, but their findings are now being questioned by other men. It seems probable that the nature of the coating varies to some extent among different kinds of insects. It is definitely known that the coating is not necessarily completely continuous all over the insect. Perhaps the important point to remember at the moment is the fact that the coating is of a waxy nature. A liquid that will not wet or flow freely over wax is not likely to have good contact qualities on an insect. Conversely, a liquid that will spread out readily over a waxy surface, quickly forming a thin film, is likely to have good contact qualities on an insect. A block of common paraffin is not a bad indicator for ready experimentation. If a drop of a given spray material, when diluted ready for use, stands up over this, retaining more or less spherical shape, it is likely to give more or less the same performance on an insect. Therefore, though it may contain a suitable toxicant in suitable amount, it may fail to give satisfactory performance as an insecticide.

It was pointed out that in thinking of contact qualities of spray materials we may call the surface of the insect X, and the spray material Y. As for the characteristics of "Y" and its ability to make contact, we can deal more fully with facts and less with theories. There are ready means of determining important physical characteristics of a liquid. We can readily ascertain its viscosity. We usually can find out all we need to know about its volatility. When we come to its chemical nature we may find the facts fully in hand, or, we may discover that much remains to be ascertained. We may find that its molecular structure is well understood, or is only conjectured.

Usually a contact insecticide involves a carrier, which is a liquid, and one or more toxicants, which are embodied in that liquid. Even if the carrier is a petroleum oil, which possesses some measure of toxicity in itself, other substances may be added to that oil to step up its performance. This, of course, is strikingly true in the case of fly sprays. While the carrier

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here is a petroleum derivative of suitable characteristics, and while that carrier does in itself possess a certain degree of toxicity against many household insects, it is so vastly improved by the addition of one or more toxicants dissolved in it that this is now the established practise. As a carrier the petroleum oils used in the manufacture of household insecticides possess marked contact qualities. They will carry with them the toxicant dissolved in them. If they were unable to do this they would not give the performance which is characteristic of them, and they probably would have nothing like the wide use that they enjoy.

That the petroleum oils used for this purpose can and will be improved is altogether likely. After all, a household spray kerosene is a highly complex mixture of a great many substances. Although it be standardized as to freedom from undesirable odor or color, and as to safety from fire hazard, and although a given kerosene of good quality is the same today, tomorrow, and next year, this standardization is arrived at by adhering to a uniform method of manufacture rather than by isolation and manipulation of the various constituents that make up the kerosene. In freedom from strong odor, very good products are on the market. But it is my belief that this has been achieved through some sacrifice of optimum volatility. In many situations, such as offices, homes, stores, restaurants, and other places, adequate spraying with a household fly spray leaves too much oily deposit on furniture. An improvement in this respect is one direction in which progress may be made as time goes on.

There is, of course, another kind of contact spray which is in a different category from the fly spray and which is intended for application on plants. Except for those which utilize application of a fine mist of the concentrate, these sprays involve the use of water as the final diluent and carrier. Therefore, they involve the relationship of water to the surface of an insect. This relationship is definitely unfavorable. Water by itself is not able to make good contact with the waxy coating of insects. For this reason it is necessary to add a so-called wetting agent to the water.

Wetting agents involve some known facts and some theories.

The logic of a wetting agent is to introduce into the water, which already contains a toxicant, a third substance, the molecule of which will have an essential relationship to the water and at the same time a favorable aspect as regards the insect surface. For this purpose various soaps offer certain advantages, long since recognized. In sufficient concentration they will cause water to form a film over an insect, although that film may not be as complete or as rapidly formed as would be the case with a petroleum derivative, such as kerosene. The concentration of soap is important. If too little is used the film is not adequate, and if too much there are disadvantages, both as to cost and as to performance. Unfortunately, some of the common soaps react with hard water and lose their effectiveness. Other newer wetting agents, developed primarily for use in the textile industry, can be used at much lower concentrations. They are a step in an interesting direction. The several groups of chemicals that they represent are receiving ample study in chemical laboratories, and are likely to yield further advances. Incidentally, it is interesting to note that even in the application of a straight petroleum derivative, undiluted with water, the presence of a wetting agent may improve performance.

If the carrier be water the addition of a toxicant is, of course, essential. If it be oil, an added toxicant is common practise. Therefore, the search for active toxicants has been actively prosecuted and is proceeding with undiminished vigor.

It is interesting to find that toxicants of plant origin in wide use represent only two types of plants, and that neither one of these was discovered by present-day investigators. Pyrethrum flowers have been used for many generations, although in a different way from that now typified in fly sprays. Derris, cube, and the allied roots, have long been known, though used originally for a different purpose from that of killing insects. That these plants represent the only ones that could be used commercially is not likely. The number of kinds of plants in the world is too great to assume such narrow limitations. We know that other plants do possess toxicity against insects, but the question is to what extent one or another of these can be developed commercially. I think that as time goes on we shall see something tangible in this direction, though it may not be for a considerable period. It is a good subject to keep in touch with.

Toxicants of factory origin, that is to say, chemical substances that can be made in a chemical manufacturing plant, have had marked attention in recent years and are the subject of increasing activity in research laboratories. Outstanding progress has been made in the development of new chemical compounds that possess the property of killing insects, without at the same time being handicapped by impossible disadvantages. This latter point is, of course, the difficult hurdle. There are a great many substances that will kill insects, no doubt many hundreds of them. But they are likely to be too toxic to human beings, or to have other undesirable qualities. The specifications to be met are necessarily exact. For example, the chemical must be capable of standardized manufacture, it must be adequately soluble in the carrier to be used, it must be safe, it must be cheap enough to compete with established products, and so on. Nevertheless, in spite of these and other limitations, outstanding progress has been made and further discoveries may be expected. Able chemists are at work in well-equipped and resourceful laboratories. This also is a field to keep in touch with. It is well to remember that the number of organic substances that can be made in a chemical laboratory is inconceivably large. Every new group that is developed becomes the starting point for a series of additional groups. In all this array, both known and unknown, there are likely to be substances that can serve as effective toxicants for killing insects.

Looking ahead it seems entirely probable that the number of different sprays in general use will increase rather than diminish. New discoveries are not likely to supplant materials that are now widely employed. They are more likely to supplement them. The reason for this is to be found in the diverse needs that contact sprays can or should meet.

To enumerate some of those needs consider the following situations where contact sprays are employed or could well be employed.

a. Household use in occupied premises—the type of application which the fly sprays now widely manufactured exemplify. The requirements that these are obliged to meet are manifest, such as safety, freedom from unpleasant odor, freedom from stain, and so on.

b. Sprays for use in buildings that are not occupied by human beings. Here the requirements can be radically different from those in the preceding paragraph.

c. Sprays for use in factories manufacturing food products. Here again the requirements are different and and the insects to be killed are different. Oily residues are objectionable. An odor, even though pleasant, may be a strictly limiting factor.

d. Sprays for outdoor use, in the soil, or in timbers, and in other situa-

tions not involving applications on plants. Here, once more, the specifications to be met are different from those in the preceding sections.

e. Sprays for use on plants, including both the dormant sprays and those that may safely be applied on plants in leaf. With these the matter of odor becomes of less consequence. The matter of safety to plant tissues becomes paramount. High volatility instead of being desirable may be undesirable. The entire set of requirements is different from those of preceding paragraphs.

Since the needs to be met are diverse, and since they are definitely increasing, both in number and in variety, it follows that we need various materials to serve as carriers for contact sprays, and we need various toxicants. No single carrier or single toxicant is going to meet these various needs. No one spray, however effective for certain uses, is going to supplant all the others. We shall have a variety of materials, each adapted to certain needs, or groups of needs. New materials yet to be developed are likely to find outlets which are not present filled at all.

From all of this a course of action seems clearly indicated, both for the manufacturer and for the scientific worker. This may be briefly expressed as follows: Keep in touch with developments. Take part in them in any constructive way that may be possible.

Dr. Arthur Gibson, Dominion Entomologist, Honored on Retirement

After more than 42 years of activity in the realm of Entomology in Canada, of which 22 years were in the role of Dominion Entomologist and head of the Division of Entomology, Science Service, Dominion Department of Agriculture, Dr. A. Gibson—good friend of the P.C.I. in the United States—was honored on his retirement as Dominion Entomologist by members of the Division of Entomology, with a silver tea service on January 15.

Dr. Gibson was born in Toronto in 1875 and joined the staff of the Dominion Department of Agriculture in 1899 as assistant in the Division of Entomology and Botany, Central Experimental Farm, Ottawa, from which office, in a series of successive advancements, because of intensive study, ability and diligence, he was appointed Dominion Entomologist in 1920 as successor to Dr. Hewitt who had died. In the past 20 years the work and services of the Entomological Division have been extended and kept abreast of the increasing demands incidental to the growth and development of the country. The direction and administration of these varied activities have required a wide knowledge of entomology as well as exceptional executive ability, qualities with which Dr. Gibson has been bountifully endowed.

Dr. Gibson has maintained constant touch with the leading entomologists in different parts of the world. He has represented Canada at several international conferences on entomology. In honor of his eminence as an entomologist, Queen's University, Kingston, Ontario, conferred on him the honorary degree of L.L.D. (Doctor of Laws). Moreover, Dr. Gibson has held such high offices as Chairman, Canada Destructive Insect and Pest Act Advisory Board; President, American Association of Economic Entomologists and many others of equal rank and importance—all indicative of his direct link with active entomological associations.

We take this oportunity to wish Mr. Gibson well in his well earned retirement. No doubt he will be missed. In his less arduous days to follow, he should find reason for deep inner satisfaction stemming from the knowledge that his contribution to the cause of entomology will be an important factor in the war service and the reconstruction period to follow.

Quotation for the Month

The crown of all faculties is common sense—that not only has talent to do, but, also, tact to know when and how to do it.

—William Matthews.

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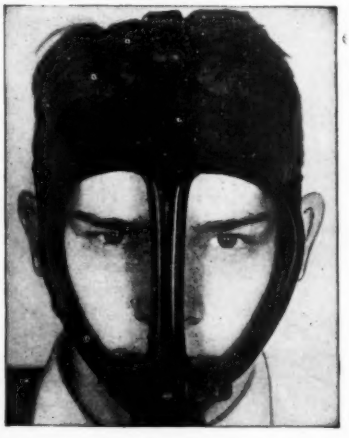

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The Control of Wood Decay

By MALCOLM A. McKENZIE, Ph.D., *Massachusetts State College*

EDITOR'S NOTE: *Presented at the Second Annual Eastern Pest Control Operators' Conference, Massachusetts State College, Amherst, Mass., January 12, 13 and 14, 1942. Contribution No. 432 of the Massachusetts Agricultural Experiment Station.*

I. The Cause of Decay in Wood.

IN GENERAL, untreated wood in which the moisture content is 20% is suitable for invasion by the organisms which cause decay. Decay fungi thrive in any substance when suitable conditions of air, moisture, temperature, and food permit. Partly seasoned wood is an ideal medium for growth of decay fungi and to better understand the reason for this, it is necessary to understand also, at least in part, the life of the fungus organism.

The mushrooms which we sometimes get on taxable steak dinners nowadays are known to botanists as non-green plants. The fleshy cap-like structure which is commonly seen is the fruiting body of the plant and is adapted to spore production, being equipped with gills or some corresponding mechanism to disseminate the tiny spores which take the place of seeds in the higher plants. Under favorable conditions of moisture, etc., a single spore shed from a gill of a mushroom may produce a thread-like structure invisible to the naked eye which, as long as conditions remain favorable, may continue to grow until a conspicuous mat (mycelium) clearly observable to the naked eye has been produced. If the medium in which this spore germination and growth took place was a piece of wood, considerable damage has been done to the wood as the fungus obtained its nourishment and thereby extended its growth between or within the cells or small units of wood structure. If conditions favorable for fungus growth continue as in the case of commercial mushroom culture, in nature, and sometimes also in wood, the fleshy body which we commonly recognize as a spore-producing mushroom will be formed by the mycelial mat slightly hidden in the soil or wood. It should appear, therefore, that fungus spore material is relatively abundant in the atmosphere, since the situation described prevails rather widely. But if further proof were needed, examine plates of a culture medium exposed to various conditions, i.e., out-of-doors at minus 15° F., in the laboratory at 70° F., dust from the floor, tissue planting from a piece of wood from a woodpile, etc. However, if one digresses momentarily from the consideration of fungi as the cause of wood decay, he finds that the wide distribution of fungi is not necessarily always a blight on society. A moment of reflection will recall countless ways in which fungi render valuable service to mankind as natural scavengers in clearing the earth's surface of organic debris, in building up soil for agricultural purposes, in fermentation processes and as food—to mention only a few fundamental benefits.

"I want the kind of poison that ants eat and then go and tell the other ants about."
—Courtesy the New Yorker.

II. Properties of Wood Affected by Decay.

Many uses to which wood is put under artificial conditions in modern society increase its vulnerability to attack by decay fungi and damage may be of such a serious nature as to make the use of wood under certain conditions impractical unless it has been given protective treatment. Probably no substance which serves society has been abused more than wood. To begin with, wood is so highly adaptable to a multitude of uses that it has been the basic substance in countless enterprises where oftentimes no thought whatever was given to the nature of wood or to an understanding of treatment which might prevent or delay its failure in service.

The nature of the physical, mechanical, and chemical properties of woods independently and collectively are ultimately the bases upon which rest the value of wood in service. A thorough understanding of decay in relation to these properties which make wood valuable, therefore, is essential to an intelligent use of wood. Wood may deteriorate in other ways

but only living organisms can cause its decay. Among the properties of wood affected by decay the following may be cited as illustrations: color, thermal conductivity, odors, weight, density, brashness, strength, chemical composition of cell walls, and cell contents. Given the same thoughtful anticipation of the demand to be made upon the material and the conditions of service that is given to other substances being considered for a particular purpose, wood may well outrank all other substances in the variety and value of the uses to which it may be put. It is not surprising that wood has sometimes failed in service. It is, on the contrary, surprising that recorded failures are not more numerous in view of the widespread misuse of wood.

III. Resistance and Susceptibility of Wood to Decay.

It was early observed that there is considerable variation in the natural resistance to decay of different woods. Whether this apparent resistance is primarily chemical or physical, or both, is not certainly known. In some instances decay may be a matter of chance or environment. In all woods, however, limitation or susceptibility to decay may be induced through the adequate adaptation of the wood to the use to which it is put as well as through proper infiltration of wood preservatives.

IV. Practices Helpful in the Control of Wood Decay.

Recalling that wood may deteriorate in other ways but may decay only if decay organisms are active, it should be emphasized that decay is commonly caused by the minute threads, or hyphae, of plants known as fungi growing in wood. The most conspicuous and often the only parts of these fungi seen in casual observation are the fruiting bodies (conks, mushrooms, toadstools, etc.) which liberate spores into the air from which new fungus growths start whenever a suitable medium is reached and other conditions are favorable.

The limiting of conditions favorable to fungus growth, therefore, is of utmost importance in attempting control practices. The two principal ways in which fungi can be kept from growing in wood are: (1) Poison the wood by subjecting it to a preservative under pressure. (2) Prevent decay fungi from obtaining water and thereby exclude them from wood. Dry wood is sound wood, and the dry rot rumor is indeed "ROTTEN OBSERVATION." The 20% moisture necessary for the growth of decay fungi in wood is less moisture than is found in green wood. However, 20% moisture in wood used for construction may result in other damage as well as in decay.

The following suggestions which will help to prevent decay may be variously adapted to use in existing buildings, remodeled buildings, and new buildings.

1. Choose the building site intelligently. Locations to be avoided include marshy spots where the water table is at or near the surface, areas in which rain water and melting snow might accumulate, as well as other sites in which some factors might favor decay by making it difficult to keep the contemplated structure dry.

2. Make sure lumber to be used in construction is dry and free from decay when purchased and kept dry while awaiting installation.

3. Place no untreated wood close to the ground. Definite information on this point should be established after considering variation in the availability of the more decay-resistant woods, prevalence of extremely des-

(Continued on Page 32)

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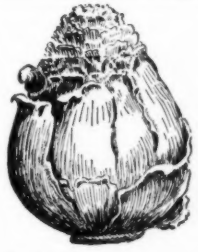

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Housefly Control in Relation to Poliomyelitis

By GEORGE E. SANDERS, B.S.A., *New York, N. Y.*

EDITOR'S NOTE: *Following paper was read by Mr. Sanders at the Second Eastern Pest Control Operators' Conference, Massachusetts State College, Amherst, Mass., January 12, 1942.*

THE subject of Housefly Control is now of particular interest in view of the growing conviction that some one or more species are vectors of the virus of poliomyelitis.

There is an old saying that "An ounce of prevention is better than a pound of cure." As entomologists and persons well versed in insect control, our knowledge of curative medicine is very elementary. On the other hand, the knowledge of our medical friends of insect control and insecticides is just as sketchy. For a number of years the Warm Springs Foundation, organized and directed by President Roosevelt, has been doing a wonderful work in the treatment of persons afflicted by poliomyelitis. The work of the Warm Springs Foundation has always been more to alleviate than to cure. If you attend any of the President's Birthday Balls at the end of this month, you will be contributing to the Warm Springs Foundation since the proceeds from these affairs form its main source of revenue. Poliomyelitis, dreadful as it is, cannot be regarded as a wholly unmixed evil since the brain activity of those suffering from the disease is in most cases greatly increased or above the normal for the family. The medical men have made great progress during recent years in the cure of poliomyelitis due to the discoveries of Sister Elizabeth Kenny of Queensland, Australia. This, however, does not minimize the value of prevention by means of insect control, which is particularly our own function in the fight against poliomyelitis or infantile paralysis. All in all, the control of poliomyelitis appears to call for a co-operative effort between the insect control operators and the medical practitioners as is now the case in the control of many tropical diseases.

Some years ago, Dr. C. T. Brues now of the Biological Laboratories at Harvard University, noted the close parallel of the curve of prevalence of poliomyelitis and that of the stable fly **Stomoxys calcitrans.** This fly also goes under the name of biting housefly, dog fly, etc. In appearance, it closely resembles the common housefly but differs in having a sharp proboscis with which it bites man and many animals, whereas the common housefly or typhoid fly does not bite. You will recognize it as the fly that bites you through your stockings in the late summer and fall. Dr. Brues carried on his experiments with apes and was successful in transmitting poliomyelitis from one ape to another by using the stable fly as the carrier. Numerous experiments have since been carried on in this connection, but none exactly paralleling those of Dr. Brues.

Recently, popular interest in the transmission of poliomyelitis has been aroused by the experiments and findings of Dr. John R. Paul and his associates at the Yale University School of Medicine. Dr. Paul and his associates proved the presence of the virus of poliomyelitis in sewage, in the excreta of persons suffering from certain types of poliomyelitis and in the bodies of various flies frequently associated with sewage.

The evidence of Dr. Brues and Dr. Paul and his associates would seem to justify a great deal more investigation and experimentation in the field of poliomyelitis transmission by flies, if not a wide fly clean-up campaign. There is, however, more evidence, all pointing toward the stable fly as the most common carrier. Widely scattered single cases of poliomyelitis point to a carrier that can travel long distances. Marked stable flies have been taken 52 miles from the point of liberation. We have had unusually heavy outbreaks of poliomyelitis in such states and provinces as Minnesota and Manitoba, where towns are scattered and manure is scarce but when enormous rotting straw stacks are much more numerous than houses. The stable fly is the only fly that I know of that will breed as readily in a rotten straw stack as in manure.

While other biting flies such as the greenheaded flies, Tabanids, found at beaches and other biting flies more likely than not, can and do carry poliomyelitis, the evidence points to the stable fly as the most common carrier. It fulfills every requirement; it has been proved to carry poliomyelitis by Dr. Brues, its curve of prevalence parallels that of poliomyelitis; it breeds as readily in straw on the prairies as it does in the manure outside a stable; it can and does travel long distances and along with other flies; it is very often common where sewage and garbage are exposed.

Measures taken for the control of the stable fly will of course automatically control numerous other species of disease carrying flies that infest houses and on this account alone, will pay many times over for the cost of control measures. Among these flies are the common housefly or typhoid fly **Musca domestica** which breeds for the most part in horse manure, garbage and animal refuse. The large stable fly **Muscina stabulans** which prefers cow manure as a breeding media but will breed in anything that the housefly breeds in; the lesser housefly **Fannia canicularis** breeds freely in human excrement, pig manure and garbage; the latrine fly **Fannia scalaris** breeds almost entirely in human excrement but can get along on pig manure; the blow flies **Calliphora spp.** breeds almost exclusively in meat or fish as do the green and blue bottle flies **Lucilia spp.** and the flesh flies **Sarcophaga spp.** The drone fly **Eristalis tenax** resembles a honey bee and the larva, the rat tailed maggot, breeds in slowly running sewers, water heavy with nitrogenous matter such as manure, in open water closets, etc. All of the flies mentioned carry one or more of the following diseases: Typhoid, dysentery, cholera, anthrax, yaws, opthalmia, plague, tuberculosis, smallpox, leprosy, taenia, cause myiasis, etc. Some of these diseases are carried by several species of flies. Further, regarding breeding media, Prof. W. P. Flint, State Entomologist of Illinois writes me that of all breeding media on the 2000 acre University Farm at Urbana, he finds hog manure is preferred by most flies to a very marked degree.

My first real experience with houseflies was in 1908 working with the late A. A. Girault under the late Dr. S. A. Forbes at the University of Illinois. There we bred flies from various

kinds of manure, from earth closets, dead animals, garbage, decaying vegetation, etc. We worked out the life histories of several species and rate of reproduction, also length of life of the various stages under different temperature conditions. We worked some, on the control of larva in manure but did not get very far. Our tests with borax were unsatisfactory. You will remember that in 1908 very little was known of insecticides—such things as calcium arsenate, sodium fluoride, pyrethrum fly sprays and derris products were unknown as insecticides to say nothing of our modern organics. We tried spreading the manure thinly on fields and found that gathering and spreading manure weekly or oftener practically prevented houseflies from maturing in that manure. We isolated seven species of hymenopterous parasites from the puparia of the common housefly, six of them new species, the other **Spalangia nigra** was described in Germany some 60 or 70 years ago. The three new species of Spalangia were never described. The three new species of Pteromalids were described in Psyche in 1910 and 1911. I have since found two more pupal parasites of the housefly, one of Staphylinid and one a Cynipid, making nine species of pupal parasites of the housefly that I know of, five species of which are not yet described.

My next work on flies was under the late Dr. C. Gordon Hewitt, Dominion Entomologist at Ottawa in 1911 and 1912. There I worked on methods of control and still found the most practical means of control was gathering and spreading the manure thinly on fields at least once per week. There was still no chemical that was cheap enough and that would prevent fly breeding in manure and not spoil the manure for agricultural purposes. At Ottawa, we did some work on the life history of **Tropidopria conica,** the most common and useful parasite of the rat-tailed maggot **Eristalis tenax.** At Ottawa, we also developed an easy way of marking flies on a large scale to determine the range of flight. We used thousands of flies and sprayed them lightly with a dilute solution of the very sensitive indicator, Rosolic Acid. We liberated the flies from the cage and placed sheets of tanglefoot fly paper at intervals of a few hundred yards from the point of liberation. The sheets were gathered and replaced from time to time. On dipping the sheets in a solution of caustic soda, each marked fly showed as a red spot in the solution. Up to this time, flies had been marked with a dot of paint. The rosolic acid method allowed us to mark easily as many thousands of flies as we chose to breed.

My next experiments with flies were in 1938. Houseflies were so numerous in and about the John Adams High School in New York that the Board of Education was considering the closing of the school. Dr. Edward Bocker of the New York City Board of Health asked me if anything could be done. I inspected the school and found plenty of flies. I also found that the Aqueduct Race Track was only a little over a half a mile away and was undoubtedly the breeding source of the flies. I reported to Dr. Bocker and fortunately, he was very friendly with Mr. Jas. Fitzsimmons, the famous trainer who makes his year round headquarters at Aqueduct. Dr. Bocker introduced me to Mr. Fitzsimmons who gave me every assistance possible in carrying on the experiments in fly control.

The control of flies is of particular interest to horsemen for when flies are numerous, many horses run their race fighting flies **in the stable** the night before, instead of **on the track** the following afternoon.

A little better list of chemicals was now available than in 1912. Some work in spraying and dusting manure

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piles had been carried on by the Bureau of Entomology. Tests on the tolerance of plants to sodium silicofluoride in the soil had been carried on by Prof. S. Marcovitch of Tennessee. Derris powder was plentiful.

I tried spraying and dusting the manure piles with various materials—ammonium silicofluoride, borax and sodium arsenate as sprays and white arsenic, derris powder and sodium silicofluoride as dusts. None of these methods gave satisfactory results — in reasonable amounts they did not kill all of the larvae and nothing less than daily treatment would have to be made. The manure was sold for agricultural purposes; a lot of it for use in mushroom houses. In the amounts needed to give even moderate fly control, the arsenic and the borax would kill most of the plants that should thrive on it. The derris was too expensive for practical use. Marcovitch's finding, that plants were stimulated by 500 lbs. of sodium silicofluoride per acre and tolerant to 3500 lbs. per acre, made the silicofluorides the logical materials to use since at that time sodium silicofluoride only cost around six cents per pound.

One day, while digging in the ground for puparia, from which to breed fly parasites I found that where I had sprayed a small pile of manure with ammonium silicofluoride that the larva burrowing into the ground to pupate, did not complete pupation. Sometimes the larvae died before starting to pupate; in some cases it was half larvae and half puparium. The small residue of silicofluoride in the soil was preventing pupation and giving effective fly control. I then made arrangements to have all of the manure at the track gathered weekly and removed. In extremely hot weather, say when the day temperature is over 90° F., the manure should be removed twice per week, for at such temperatures the housefly may develop from an egg to an adult in eight days. The manure from each stable holding up to twenty or thirty horses each, was always piled in the same spot. These spots were dusted heavily with sodium silicofluoride. About one pound of powder was used per square yard of soil or about 300 lbs. were used for treating the 25 stables at Aqueduct.

In less than one week after this treatment, there was a decrease in the number of flies and in two weeks, they were no longer a serious nuisance, either at the track or at John Adams High School. Mr. Fitzsimmons tells me that in addition to flies being well controlled at the track after treatment in 1938, that he is sure that flies have been less numerous in 1939, 1940 and 1941 than in years previous to the treatment.

We know nothing of the lasting qualities of sodium silicofluoride in the soil. We do know that it is soluble in water to the extent of 0.65%. We know that most lead arsenate is water soluble to the extent of about 0.4% of metallic arsenic and that when used at the rate of 1500 lbs. per acre, will kill larva of Japanese beetles ten years after application. So it would not be surprising to find soil treatment with sodium silicofluoride as described, effective one, two, three or even four years after treatment. The outstanding advantages of sodium silicofluoride for this sort of soil treatment are that in the amounts that might be mixed in manure, it is a plant stimulant and that it is more toxic to insects than arsenic and at the same time less toxic to warm blooded animals including man than arsenic.

After the experience at Aqueduct Track, Mr. Charles Opitz and I got in touch with Warden McGee of the Department of Correction at Rikers Island. This island was a garbage dump; its area having been increased from the original 80 acres to 400 acres by dumping garbage. It is now used by the Department of Correction as a prison. In 1939, about 1600 prisoners were kept there. The waste from the kitchen was used to feed about 350 hogs. About 20 horses were kept. In 1939, the horse manure was kept for weeks in one big pile. The flies were so numerous in the dining hall of the prison, that a paint spraying machine was used to apply pyrethrum spray to the flies. When the spraying was completed, the dead flies were so thick on the floor, that it was dangerous to walk on it for fear of slipping, until the flies were swept up.

Warden McGee turned over 14 prisoners to Mr. Opitz and myself and it took us two days to complete the fly control work, although the prisoners were as good a working crew as I have ever seen. We treated about the two horse stables in the same manner as we did at the Aqueduct Track; the pile of horse manure was spread thinly on the field, and is still hauled out and spread weekly. The places where garbage was stored, from the kitchens, on the way to the hog pens, were treated by dusting the earth with sodium silicofluoride. When we came to the hog pens, we could not use any poisons, so we took a water miscible pyrethrum, derris resin solution and thoroughly drenched all the hog pens. The flies breeding about the hog pens were mostly green bottle flies.

Warden McGee has stated that the treatment caused a very marked decrease in the fly population. In fact, he was so pleased with the work that he insisted on paying us for it. Perfect work was impossible, for we could not treat the garbage that was being dumped there daily.

These two fly control operations, you will understand, were on a large scale and were not perfect — they could not be, nor can any large operation be and keep within the limits of reason and economy. But from them, I am convinced that by thorough soil treatment with sodium silicofluoride and hauling out and spreading the manure at least weekly during the fly breeding season, and other measures suggested later in this paper, that the housefly population in any large area, say a square mile or so can be greatly reduced. When we consider the area that can be kept relatively fly-free by thorough treatment within the area no exact statement can ever be made. We know that while the stablefly has been known to travel or be carried by the wind over 50 miles, that probably more than 75% of most species of flies never get more than 100 yards from the place where they breed. What we may estimate as 60%, 75% or 90% control or reduction, cannot be more than a good approximation. The foregoing are the methods that I have found successful in the prevention of fly breeding. Needless to say, many other methods have been found successful in cutting down the fly population. Let me recount a few of them.

Prof. W. P. Flint, State Entomologist of Urbana, Ill., with whom I was associated at Urbana for three years, has written me of the methods that he used in the fly control on the 2000 acre farm connected with the University at Urbana, and which Prof. Flint states has reduced the fly population there by some 80%. All of the manure is hauled out every five days and either spread thinly on the land or is piled in straight-sided ricks and the ricks covered with a waterproof black tarpaulin. The heat generated by the fermenting manure and held in by the tarpaulin and the black tarpaulin absorbing the sun's rays, together create enough heat to prevent fly breeding in the ricks. All areas where flies may breed are inspected at least weekly by a graduate student. The 80% reduction in the fly population at the University was obtained in spite of the fact that the pens where some 200 experimental steers and an equal number of hogs were fed could not be treated nor the manure removed.

It has been found by investigators of the Federal Bureau of Entomology and Plant Quarantine that Phenothiazine fed to animals in the proportion of one gram to 45.4 kilograms or 100 lbs. of body weight daily, prevented

the breeding of flies in the manure. This method is particularly applicable to pigs and poultry which are in no way harmed by it. It is widely applied to cattle and other ruminating animals, particularly during the horn fly season. It cannot be applied to dairy cows because it taints the milk. Phenothiazine unfortunately is dangerous to horses and cannot be used on them. There seems a good prospect that suspensions of phenothiazine may prove of value in spraying or drenching manure piles and other fly breeding media.

In the case of the great grain producing areas, the combine or header is doing away with the straw stack in many of the drier areas and should be encouraged from the standpoint of fly control. In areas where straw stacks are necessary, the straw should be hauled out and spread thinly on the land during the winter or the stack burned as soon as possible. Where scattering or burning is not practical and in the case of straw stack shelters for hogs and cattle, the use of tear gas or chloropicrin, marketed under the trade name of Larvacide seems practical if repeated at about weekly intervals until the straw stack is no longer a fly breeding menace. Plowing a couple of furrows close to and around the stack and toward it will help hold the gas in the stack. Tear gas is not only heavier than air but is heavier than water and injected from the top of the stack will quickly spread to the bottom and remain there for a time. Tear gas is a very excellent insecticide and is readily handled in the open without a gas mask. It can be emulsified and should have value in spraying or drenching fly breeding media.

The old reliable tanglefoot fly paper and the fly swatter still have their place and use in decreasing the fly population. The objection has been raised that a dead fly still carries as many bacteria as a live one. That objection might in part be nullified partially by treating the fly swatter from time to time with some such disinfectant as hexylresorcinol (S. T. 37 of Sharpe and Dohme) which is colorless and odorless. The Tanglefoot people might incorporate such a disinfectant as well as a lure to flies in their very fine tanglefoot fly paper. These seem things worth further investigation. One thing we can be sure of—a dead fly will not spread its load of bacteria so widely as a live one. Copper, brass or bronze fly swatters are perferable on account of the germicidal value of the metal.

Fly sprays based for the most part on kerosene and pyrethrum have wide use, between ten and twelve million gallons being used annually in the United States. That is, however, less than one gallon per year to each ten persons, and plenty of fly spray being used for other purposes than killing flies. Less than one tenth of one gallon per person seems much less than should be used in order to keep homes, schools, factories, barracks, horse stables, cow stables and other such places reasonably free from the fly nuisance and menace of fly borne diseases. Flit, one of the widely used fly sprays contains in part rotenone, an extract from derris root the old Chinese fish poison; others contain one or another of the synthetic thiocyanates sold under the trade name of Lethane, others contain isobutylundecylenamide, now sold under the name of Pyrin. Isobutylundecylenamide is not an insecticide by itself but serves as a very effective activator of Pyrethrum. Various other insecticides and activators for use in fly sprays are being developed rapidly. Lethane, one of the newest, is quite widely used as a pyrethrum substitute. Chemically Lethane 384 Special, one used in fly sprays, is butyl carbitol thiocyanate.

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should be screened closely with a fly screen running 20 meshes to the inch. Copper, brass or bronze screen is of course preferable to iron on account of their greater lasting qualities and toughness, also copper, brass and bronze screens in the weather have considerable disinfecting value, in that bacteria left on a copper, brass or bronze screen cannot survive very long.

The use of mosquito bars about beds and sleeping quarters is another method of repelling flies that should be encouraged although we usually associate mosquito bars with the tropics or the semi-arctic countries for protection against mosquitoes. Infants' and children's beds should be covered with mosquito bars during the fly season.

In connection with the use of fly sprays, screens and mosquito bars, it is well to remember that the stable fly, which we believe to be the most common vector of poliomyelitis, is a sun loving fly and does not enter houses so much during bright sunny days as on dark or rainy days. The fly screens and mosquito bars should be attended to, more, on dark days and more fly spray used.

Pupal parasites I am sure can be used to advantage in the control of houseflies, stable flies and their relatives that breed and pupate in similar media. We know that the tiny egg parasite **Trichogramma minutum** is now reared in captivity by the thousand and sold to orchardists and grove owners in lots of around 20,000 each for liberation in orchards and groves for the control of such insects as the codling moth and other pests. We know that many of the imported parasites have been used with great success in the control of many imported insects such as the gypsy moth, the brown tail moth, the Japanese beetle and similar insects. Girault and I found that one of the housefly parasites that we discovered in Illinois, **Nasonia brevicornis** was very easily reared in captivity, that one female would deposit more than 100 eggs and that it would parasitize not only the housefly but the puparia of any fly nearly related to the housefly. Housefly puparia are now reared by the thousand in captivity for testing work and it would be a simple matter to parasitize them and put them out in cages in fly breeding areas so that the parasites could escape but the flies from the puparia that the parasites missed, kept inside the screen and later destroyed. I know that this can be done and it should be a practical means of cutting down the fly population by at least 10%. The parasites could be bred and liberated in the spring and when the time came for the stable fly to become numerous the parasite would also be numerous from having bred up on other species of flies during the spring and summer. Some years ago there was a severe outbreak of the stable fly on the Island of Guam. Investigation showed that 40% of the puparia were parasitized by **Nasonia brevicornis.**

In connection with parasites, it is certain that all four species of **Spalangia** including **Splangia nigra** and **Spalangia fuscipennis** not described and **Spalangia hyalopennis** not described, together with **Nasonia brevicornis** named by Dr. Ashmead and described by Girault and myself, the Staphylinid which on account of confusion in the group can never in our day be named or classified and the cynipid are all primary parasites. It would seem more probable than not, that the Peteromalid parasite **Muscidifurax raptor** which Girault and I named and described is a secondary parasite on one or another of the **Spalangia larva** and so injurious in housefly control. It is also more than probable that **Pachycrepoideus dibius** which was named by Dr. Ashmead and described by Girault and myself, may be a hyperparasite on the larva of **Muscidifurax raptor** and therefore beneficial. I mention these things because in breeding fly parasites, one should be sure that it is a beneficial parasite that is being bred and I have to use the technical names because very few parasitic insects have common names.

One phase of fly control on which we have no data is that obtaining about swampy areas often close to bathing beaches and factory towns. The stable fly we know breeds in decaying vegetation such as we find about the marshy areas of New Jersey; the various species of Tabanids of which there are a great number and the females of practically all of them live on blood, may breed in water, in semi-aquatic vegetation or in moist earth and no feasible means of controlling flies breeding under such conditions have been suggested. This is our most untouched problem in fly control.

The latest development in fly control which is applicable to the control of many other insects is one made at the request of the War Department by Dr. R. C. Roark in charge of Insecticide Investigations for the Bureau of Entomology and Plant Quarantine and his assistants. The War Department asked for a fumigant for airplanes that was rapidly effective, non toxic to humans, was not a fire hazard and was non-injurious to fabrics and metals. In six months, Dr. Roark, and his assistants, L. D. Goodhue and W. N. Sullivan, gave them a compound that met every requirement in detail. In my opinion, a very wonderful achievement. His answer was one of the freeon gases, dichlor difluor methane containing 0.4% pyrethrins and 1% oil of sesame. This compound is packed in cylinders under a pressure of 95 lbs. It has been used successfully in household fumigations and in the protection of garden parties from flying insect pests. It would appear that this compound has many applications other than those enumerated.

In the matter of fly repellents, many have been tested, some I believe patented. For some reason, they are not widely applied although a good repellent is wanted by horsemen, dairymen and stockmen in general. Sta-Way seems to be the best repellent to date. Sta-Way has for its active ingredient di ethylene glycol monobutyl acetate. Some essential oils seem to have promise as repellents, particularly oil of lavender. Most of the common fly sprays have definite fly repelling value.

One will gather from this paper that there is plenty of investigating yet to be done in the matter of housefly control. Because flies breed in a variety of media; because of the long distance flies may travel; because of the fact that fly control must be on a fairly wide scale to be noticeable, and because the human element is so vital a factor in control—it is improbable we can reduce the fly population by much more than 80% even with the thorough co-operation of householders, property owners, operators (such as town and county authorities, school superintendents, factory managers, etc.) of properties in which flies may breed. But an 80% reduction, I believe, is an attainable figure in any community, as Prof. Flint at the University Farm, Urbana, demonstrated when he was able to bring about an 80% reduction in flies through methods that he states were incomplete, and as we also did at Aqueduct and Rikers Island where we were able to make an estimated 80% decrease in the fly population without complete control measures. In view of evidence presented by others, particularly those engaged in the control of tropical diseases which, in many cases are more a problem of insect control or prevention, than medicine, it is reasonable to expect that an 80% reduction in fly population—which I believe any community can reasonably attain—will give a corresponding reduction in diseases actually carried by flies, thereby making fly control more than worthwhile.

BUG-A-LOGUE

By HAZEL WATKINS LAIRD

This is the last of a series of five articles prepared by Mrs. Laird, A & M Termite Co., Stillwater, Okla., for PESTS, the previous four having appeared in the last four issues. She designed the articles to make the public chuckle, to educate it through the conversations of insects, thereby, creating good will and enlarged opportunities for pest control sales. PCOs may, if they wish, reprint any or all of the articles for use in their own promotional effort, or submit them for reprint to their local newspaper, provided credit line is given Hazel Watkins Laird, as author, and PESTS, as publication source. Our thanks to Mrs. Laird for her contribution to betterment of Industry-Public Relations.—EDITOR.

MURIEL and Mollie Moth were still sweethearts, even after the many instars they had lived together. That was possibly the reason it was not so bad for Mollie to get fat and lazy after she had laid her one hundred or so eggs—her contribution to the un-welfare of humanity. Then, too, the fact that neither she nor her husband required nourishment had added to her life of ease. Mollie did not even have to cook cereals for her children because as soon as they were hatched they got out and wrestled for themselves. But it was the future of these same moth-worm children which concerned them both that hot summer's day, after Muriel had come burrowing his way down through Great Grandma's clothes in the old attic trunk.

"Oh dearie me," fluttered Mollie Moth, "if what you say is true Muriel, what shall we do? I had thought we would have nothing to worry about in rearing our larvae, with all these nice woolen clothes and things in the trunk for them to live on. Why there's enough stuff here to feed three generations of moths. And to think we have to go away and leave it all."

"I know Mollie, it's bad," replied her husband shaking his fleecy head sadly, "I nearly tumbled off the edge of the trunk yesterday, when they started dragging things out for that crazy 89-er parade. It just made me sick. To think of all of that waste, just because that silly young girl wanted to look like her grandma in the parade."

"But Muriel," spoke Mollie hopefully, "maybe they won't ever come on down to the bottom of the trunk. Maybe we can stay here anyway."

"Don't you kid yourself, my dear," retorted her spouse, "when they discover that hole in Aunt Effie's petticoat they'll come right on down. They might even get this whole thing moth proofed. No, we will have to make a quick get-a-way.

"What shall we do, what shall we do?" moaned poor Mollie, who had never worried about anything. "I was so in hopes we could save enough here to send our children to college."

"Why Mollie, that's exactly what we'll do," said Muriel, and relief showed on his wrinkled old face. "Why hadn't you mentioned that before?"

Mollie had never before been disgusted with her husband, but she was now. "Just how will we do that?", she said, "when after we leave here we shall not even have a home let alone tuition for the children in school."

"They will not have to pay tuition. Listen Mollie, remember that tour I took with Uncle Ben last Saturday night? Well I investigated a piano down stairs that night. The felt on the keys is easily accessible. We'll send the kids to college all right. And it will be a musical college at that. They can eat their way clear through school." Muriel had grown excited. He said with a sidewise grin on his imperfect mouthparts: "Mollie you and I have not long to live, but our children can certainly get even with this family for chasing us out of the trunk."

—And I suppose that is just what happened, I wouldn't know. In fact I do not know how I happened to be in on this conversation at all. I am quite certain I was not hunkered up in the bottom of the trunk.

A "Hollywood" for Roaches, Bedbugs

Columbus, Ohio—Imagine anyone's wanting to raise bedbugs and cockroaches and even make movies of them! They do it at Ohio State University to learn better how to eliminate the pests.

No one volunteered to be a dinner table for the bedbugs, so the scientists place the bedbugs in glass dishes and attach them to the shaved stomach of a rabbit once a week.

"The business that rests on its oars has a long pull ahead."

—*N. W. Ayer & Son, Inc.*

Phosphorus Paste
10 lbs., $4.25; 25 lbs., $9.
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LOCAL ORGANIZATION NEWS

New England Pest Control Association Meets January 28, 1942, Hotel Lenox, Boston, Mass.

War Service Talks Feature—Prof Chas. Blake Elected Honorary Member

With President Mark Weintraub presiding, the regular meeting of the New England Pest Control Association was devoted in good part to a talk by Geo. Elliott on the pest control industry and its part in the war situation, followed by a round table discussion; and a talk by Prof. Charles A. Blake who spoke on typhus and problems confronting the industry, which he developed around these four headings: (1) During the War (Home and Abroad); (2) Reconstruction Period; (3) Food Situation; (4) Board for Economic Welfare.

Upon motion made by Bart. Eldridge and seconded by George Elliott, Prof. Charles Blake was elected an Honorary Member of the N.E.P.C.A. by a unanimous vote. Prof. Blake responded with a short speech of acceptance.

Mr. Corey reported on a conversation he had with the Public Health Commissioner, Dr. Paul Jaknauh. Motion made by Chas. Houghton to draft resolution to be sent to Dr. Jaknauh was seconded by Geo. Elliott, Committee of Mr. Corey, Prof. Blake and Chas. Houghton. Leonard Goldman selected committee of one to contact Public Health Commission of Rhode Island.

Other matters up for consideration during the meeting were: Treasurer's report; applications for membership from John J. Gobell & Co., New Bedford, Mass., and C. A. Chafe, Quincy, Mass., were unanimously accepted; sending of forms regarding materials by President to Secretary of N.P.C.A.; priorities and tire situation; letter from Prof. Alexander to Bill Buettner, which George Elliott read; Treasurer Elliott's report of the Second Eastern Pest Control Conference.

The meeting was concluded at 10:50 with a showing of the film "WARNING" issued by the British Library of Information. Minutes of above submitted by Secretary Thomas A. Sheehan.

Connecticut Pest Control Association

At the meeting of the Connecticut Pest Control Association, which was held February 9, 1942, at the Red Schutter Inn, Meriden, Conn., J. H. L. Giles, Sanitary Engineer for the State Board of Health, guest speaker, gave a very interesting talk on the activities of his department, sewerage disposal and general health problems, which was enjoyed by all present.

The next scheduled meeting of the Association will be held on March 11. The Red Schutter Inn was again selected because of its excellent cuisine.—Report submitted by O. N. Anderson, Secretary-Treasurer, C.P.C.A.

New Jersey Pest Control Association

Regular monthly meeting of the New Jersey Pest Control Association was held at the Hotel Douglas, Newark, N. J., February 10, 1942, with PCOs from various parts of the state in attendance.

Discussion in the main centered around Senate Bill No. 28, pending in the State Legislature, designed to control exterminating operations and the use of insecticides throughout the state. Though the bill has some desirable features, it also has others which are not so desirable. A committee was formed to co-operate with the legislators in drafting a bill which when enacted into law will serve the best interests of the community as a whole, and might serve as a useful precedent elsewhere.

Highlighting the meeting was a talk by E. M. Mills, Department of the Interior, on rodent control, and the showing of a sound movie entitled, "Four Little Mice."—Report submitted by John K. Medoff, President, N.J.P.C.A.

Philadelphia, Pennsylvania

The Fumigation Examining Board of Philadelphia, Pa., of which Martin Meyer is a member, held an interesting meeting at the City Hall Annex Saturday, January 31st. Approximately 125 employees and employers attended this meeting, which took up the special subject of "Fumigation Safety Practices."

George Patterson, representative of the Department of Health, and Martin Meyer presided. C. A. Vincent-Daviss of E. I. du-Pont deNemours, Cyanide Products Division, and L. L. Lehriter of the American Cyanamid & Chemical Corporation were speakers. Clif. Brainaird of the Mine Safety Appliance Company demonstrated the proper way to put on and remove a gas mask as well as to explain other matters with regard to testing the mask. Following a Questions and Answers Period, Messrs. Stecker and Holden of the Rescue Squad of the Philadelphia Fire Department gave a demonstration of the Schaeffer Prone Pressure Method of Artificial Respiration.

Pest Control Operators of Greater Kansas City

The regular monthly meeting of the Pest Control Operators Association of Greater Kansas City was held Monday evening, January 26th. Definite plans were laid to increase membership in the Association.

New officers were elected, as follows: President, A. L. Linck, Paramount Exterminating Co.; Secretary and Treasurer, P. H. Burnett, Getz Exterminators; Directors, F. R. Andrews, Andrews Exterminating Co.; N. Pulley, Rockwell Exterminating Co., and T. P. Nichols, A.B.C. Termite Control Co.

The following members were present: R. Shuyler, Termite Exterminating Co.; T. P. Nichols, A.B.C. Termite Control Co.; A. L. Linck, Paramount Exterminating Co.; F. R. Andrews, Andrews Exterminating Co.; N. Pulley, Rockwell Exterminating Co., and P. H. Burnett, Getz Exterminators.

New York Pest Control Operators to Meet

A meeting under the joint auspices of the New York Pest Control Association and Professional Exterminators Association, to which non-members are invited as well, will be held on March 10, 7:45 P.M., at the Hotel Commodore, New York. It is expected Dr. James C. Munch, Senior Pharmacologist, Bureau of Biological Survey, will be the principal speaker.

Northwestern Pest Control Association Elects Officers at Annual Meeting

At the annual meeting of the Northwestern Pest Control Association held on January 20, 1942, the following were elected to office: President, Arnie Athelstan; Vice-President, E. H. Leitte; Treasurer, Everett Needels; Secretary, Max J. Levy.

Bill Buettner Meets With St. Louis PCOs

On Sunday morning February 1st, Bill Buettner stepped off the Sunshine Limited and hurried over to the Statler Hotel to meet with 17 local PCOs and representatives of local supply houses.

Bill showed his usual "lack of pep," from too much sleep and soon opened up with a rather complete report on the three regional Conferences which he had just attended.

Considerable discussion was devoted to the recognition our industry should receive from our National Government, and from local Departments of Health. Bill brought it out most forceably that in the past we had been inclined to act as individuals rather than as an Industry, which from necessity must cease if we are to receive proper recognition so far as being able to secure necessary chemicals for our industry.

Bill assured us that there is nothing in the present rules and regulations that gives our Industry a preference in being able to buy tires and tubes, even though because of the nature of the chemicals our service men must carry it doesn't seem reasonable that it should be necessary to have these materials transported on public conveyances. In other words says Bill, "we haven't seen anything yet so far as tires are concerned, just don't expect to buy any new tires in 1942."

The meeting closed with a discussion on the place of our Industry in Civilian Defense, for here again quoting Bill, is a wonderful opportunity for us to bring out into the eyes of our Government and local Health Departments, that our Industry is ESSENTIAL.

Bill left at 6:00 P.M., his next stop being scheduled for Pittsburgh.

Those present were: Louis C. Traband, Louis C. Traband Co.; E. F. Sennewald, Sennewald Drug Co.; Thomas C. Raley, Getz Exterminators, Inc.; Emil Ganter, Home reconditioning Co.; W. F. Exner, Termite Control Co.; Charles C. Maly, Maly Bros. Termite Control Co.; James C. Walker, Acme Termite Control Co.; Roy McCollough, Modern Fumigating Co.; Joseph E. Burger, Whitmire Research Corp.; A. Roy

Allison, Wm. Abar Exterminating Co.; Charles Denny, Charles Denny & Co.; E. A. Decker, G. S. Robins & Co.; H. H. Cassilly, City Fumigating Co.; R. M. Morriss, Jr., Antimite Co.; Dr. H. E. Whitmire, Whitmire Research Corp.; G. Clem, Rose Exterminating Co.; A. H. Meyer, Contract Waterproofing Co.

Cleveland Operators Organize

The announcement has just come that there has been completed the organization of the Pest Control Association of Cleveland. The officers are William E. Kirschner of the Cleveland Chemical Co., president; William E. Branson of Safe Way Exterminating Co., vice-president; John H. Gedden of Knox Fumigating Co., secretary; and Albert M. Akers, of the Rose Exterminator Co., treasurer.

This group has an interesting project that may call for a model manner in which a rat control program should be conducted. Funds are being raised that may mean the employment of a permanent biologist to supervise such program.

The Associated Pest Control Operators

The following report of the recent meeting was issued through the Associated Pest Control News published by the Associated Pest Control Operators, Inc.

Forty-seven gathered around the dinner table for our February meeting held on Saturday, February 14, 1942, in the Colonial Room of the U. S. Grant Hotel in San Diego, Calif. Considering counter attractions and so many of our members whose war activities will not permit them to wander far from the home base, this was a very satisfactory attendance. Everyone enjoyed the trip and the hospitality of the San Diego boys, also the Avocados fresh from the ranch of our member, John H. Martin (president of the Structural Pest Control Board) and presented to each guest present at dinner.

The building report committee submitted their report and it was endorsed by the Association and it is to be presented in our report to the Structural Pest Control Board with the suggestion that the following be added to and made a part of the present Rules and Regulations for Structural Pests:

"A building report for structural pests should be submitted in writing with a diagram attached showing infestations (if any) their locations and kind, and **must** give information as to conditions found:

Sub Area:
Foundations and Piers;
Exterior and Interior Grades;
Debris and Form Lumber;
Porches and Steps:
Soil Condition;
Ventilation—clearance between soil and girders;
Outside Stairways (if any), Pilasters, Abuttments;
Patio Walls and Columns;
Attic and Garages."

The committee on Fumigation Rules and Regulations have not as yet submitted their final report, but will present it in final form at the regular meeting to be held March 11, 1942. It seems the only point of controversy is in two subjects, namely; guards on every job and not less than two men on every job. Columbia Pest Control boys displayed a patented device for locking all doors, this safety lock makes it impossible for anyone to get through without breaking down the door. This looks like something every fumigator should have and use constantly.

Highlight of the evening was a thirty minute address by our Honorary Member, Dr. W. Dwight Pierce, senior Curator of the Los Angeles Museum. His address, "The Pest Control Operator in War Work," was food for thought for every operator.

The next meeting of this association will be held at Eaton's Chicken House in Los Angeles, Calif., on March 11, 1942.

Asiatic Cholera: Effective bombing of Japanese crowded inflammable cities might easily give rise to an epidemic of the deadly Asiatic Cholera, U. S. Public Health Service epidimiologists believe. Cholera is spread by eating raw foodstuffs and drinking water infected with the microscopic curved rods which are the cholera germs. Normal supervision of these sources would be disrupted by bombings of Japanese "paper" cities.

—*Science News Letter.*

About Pigeons: All the pigeons of Paris are dead. Some have been eaten, which is natural, but most of them have been condemned to death because they carry messages.

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Phosphorous Paste for Rats and Roaches. Contains 7%-8% ZINC PHOSPHIDE with a scent very attractive to these pests. Easily diluted with water to mix with bait. Sample pound can 50c post paid. 5 lb. can at $2.00. 10 lb. can at $3.75 f.o.b. Memphis, Tenn.

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WHAT'S NEW IN PEST CONTROL-PERSONALS

Frank D. Gates, 63, of Rockwell Laboratories, Kansas City, Mo., passed away on January 20, 1942, after an illness of several months. For many years he operated a chain of drug stores, finally selling out to enter the pest control field. He operated under the name of Frank D. Gates Exterminating Co., but devoted most of his time manufacturing insecticides under the name of Rockwell Laboratories.

He was very active in many organizations and highly respected by his friends and business associates. Imbued with a high sense of justice and fair play, he made many friends and his passing is noted as a great loss to the many activities in which he was engaged. He was an active member of the Kansas City Pest Control Association and a firm friend of the industry.

We extend to his sorrowing wife and relatives our sincere sympathy.

Dr. Wakeland to Head Divison of 'Hopper Control in U.S.D.A.: The Department of Agriculture has announced creation of the Division of Grasshopper Control within the Bureau of Entomology and Plant Quarantine to supervise cooperative programs with the States in control of grasshoppers, Mormon crickets, and chinch bugs. Leader of the new division is Dr. Claude Wakeland, said Dr. P. N. Annand, Chief of the Bureau.

While programs of control for chinch bugs, Mormon crickets, and grasshoppers have been in operation for a number of years, this is the first time that the work has been unified under one division. Headquarters for this division will remain in Denver, Colo., where they have been since 1940.

Regulations for the Enforcement of the Insecticide Act of 1910: Issued by the United States Department of Agriculture, Agricultural Marketing Service, Washington, D. C. Service and Regulatory Announcements No. 162. These regulations which became effective October 1, 1941, supersede those previously promulgated and published as part 180, chapter I, title 21, Code of Federal Regulations, which are repealed.

Dick Andes a Papa: Dick, who is engaged in the pest control business in Lancaster, Pa., writes: "My wife presented me with a son Monday, January 26, 1942, at 2:42 A.M. Michael Duncan Andes is his name. Needless to say we're tickled to death and very proud of the little guy. Mike was presented with a "Flit Gun" about 8 hours after he was born." Congratulations to the Andes and may their son, "Mike" Andes, scale the heights when he grows up.

Matilda June Helfgott Married: Matilda June, who is the daughter of Mr. and Mrs. A. H. Helfgott, Pittsburgh, Pa., was wedded to Mr. Erwin H. Brand, Friday, December 5, 1941, in that city. Felicitations, and may the happy couple have the "mostest of the bestest," always. Mr. Helfgott operates the Remo Sanitation Co. and is cooperating to make the Tenth Annual Convention of the N.P.C.A. the best yet.

Prof. J. J. Davis combines official meetings with entomologists by also visiting with PCOs. Recently in Chicago we learn of Harold E. Jennings being host at the Chicago Athletic Club as Martin Prescott and Norman Dold joined the party. Walter S. McCloud also visited with Prof. Davis.

We were glad to hear from one of our Hawaiian PCOs recently. The treachery that befell this outpost of America is still fresh in our minds and we deeply sympathize with our friends there. For this reason a few excerpts from the letter of Mr. E. L. Forde, a PCO in Honolulu will be of interest.

"Please start my subscription to PESTS with the December issue. Events over here prevented me from writing sooner and I don't wish to miss an issue. For your information, we in the Pest Control Industry are all safe and sound over here. Many of us have taken on extra national defense duties, however. None of the various offices or plants of exterminators were damaged and no persons killed or injured, to my knowledge, in our industry. One operator who was employed on Midway Island, has been returned here to Honolulu safely."

Temporary Housing by FSA Provides 12,269 New Units. Trailers and dormitories to be made available for temporary war housing by FSA under recent Presidential allocation of $13,000,000 will provide 12,269 dwelling units for workers in 24 war-industry areas. Approval of the 24 new projects brings to 50 the total number of temporary projects assigned to FSA. The projects include 11,274 trailers, 13,523 dormitory dwelling units, and 3,766 housing units. 7,603 units are completed. (Dept. of Agriculture News Release.)

A Swell Suggestion: The Manager, Copy and Plans Department, The American Rolling Mill Co., Middletown, Ohio, writes:

"I just got a flash and signed a letter "Yours for victory!"

Why not throw out the old, old banalities —"Yours very truly," and the rest—for the duration, signing all letters, "Yours for victory?"

Billions of letters flow back and forth each year and people seeing the determined closing would be constantly reminded, every day, that America is victory bound.

I have started the snowball rolling this very day, and I hope it grows and grows and grows!

Yours for Victory!

William E. McFee."

Successful Collection Letters. By William H. Butterfield. (McGraw-Hill Book Company. $2.50.) An excellent book on the subject, perhaps the best of its kind. It is packed full of examples of letters with high pulling power. Fifty of these are not only printed in full but analyzed in some length by the author. The chapter on "Seven Sins of Collection Writing" is worth the price of the book. Highly recommended to those who want examples of how the other fellow does it.

Thallium Sulphate: If any reader of PESTS can conveniently release a few pounds or even single pounds, kindly advise the Secretary of the N.P.C.A., 3019 Ft. Hamilton Parkway, Brooklyn, N. Y. In two instances the Association has requests for only one pound. When writing indicate the price at which you would sell.

Legislation: This is the usual "open season" when proposals are submitted to State Legislatures. We suggest that members keep their eyes open for any proposals that have a bearing on our industry. We call attention to the following:

a. Kentucky House Bill No. 96 — There are objectionable features in this proposal that have a bearing on our industry.

b. Kentucky House Bill No. 95 — Same comments as just made on House Bill No. 96.

c. New Jersey Senate Bill No. 28—"An Act concerning exterminators and insecticides, providing penalties for violations thereof." This bill has been referred to the Committee on Public Health.

—From N.P.C.A. Service Letter 242.

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The Cotton States Branch—A.A.E.E. Convenes for Seventeenth Annual Meeting

Devoy Hotel, Memphis, Tenn., February 3, 4, 5 and 6, 1942

Before a representative gathering of entomologists, under the Chairmanship of F. A. Fenton, Vice-Chairman Dwight Isely, and Secretary-Treasurer John T. Creighton, the program of the Seventeenth Annual Meeting of the Cotton States Branch, American Association of Economic Entomologists got under way on the morning of February 3, at the Hotel Devoy, Memphis, Tenn. There were some 58 papers, including several motion pictures, devoted principally to the subjects of agricultural insect control in the Southern States. Of potential interest to the PCO were the following:

Further Tests on the Control of Fire Ants with Thallium Baits. Bernard V. Travis, Bureau of Entomology and Plant Quarantine, New Smyrna, Fla.

Leaf Cutter Ants. Kodachrome color moving picture presented by W. E. Anderson, Department of Agriculture, Baton Rouge, La.

The Control of Stablefly or "Dog Fly," **Stomoxys calcitrans** L., Breeding in Shore Deposits of Bay Grasses. W. E. Dove and S. S. Simmons.

The Use of Creosote Oil and Water for the Control of Stablefly or "Dog Fly," **Stomoxys calcitrans** L., Breeding in Tide Drifts of Marine Grasses. S. W. Simmons and W. E. Dove.

Malaria Mosquitoes and Their Control. Moving picture in color presented by Robert B. Watson and E. L. Bishop, Tennessee Valley Authority.

Recent Developments in Fumigants for the Protection of Stored Grain. R. T. Cotton, Bureau of Entomology and Plant Quarantine.

War May Hit Derris Root Imports From Malaya

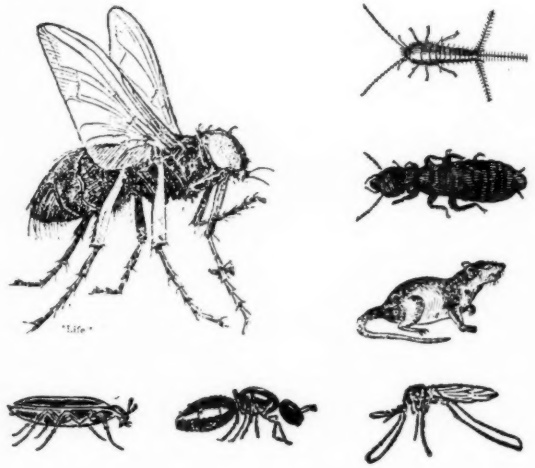
A report by Neely Turner of the Connecticut Agricultural Experiment Station, New Haven, in the New York Times, states:

For several years derris root, chief source of rotenone used for insecticides, has been imported from British Malaya and the Netherland Indies. In 1941 more than 3,000,000 pounds were obtained from the Far East.

Fortunately, warehouses in the United States are stocked with a supply of derris root adequate to last through 1942. Prices, however, are already advancing sharply. Cube root is also higher. South America, which supplied about 2,500,000 pounds of cube and other rotenone-bearing roots in 1941, may be able to develop its sources to replace the quantities formerly shipped from the East Indies.

Mr. Turner believes there is no cause for alarm about a possible shortage of rotenone. There are several alternative materials. Pyrethrum, which, like rotenone, is toxic to insects but not to human beings and other warm-blooded animals, now comes from the Kenya Colony in South Africa rather than from Japan. The price of pyrethrum dusts (which in the past was prohibitive), with a source now assured and derris prices rising, will be sufficiently lower to make them available for general use. Mr. Turner believes that the supply of rotenone and pyrethrum in reserve should postpone for at least eighteen months any shortage of insecticides for use on vegetables.

ILLUSTRATE with CUTS—



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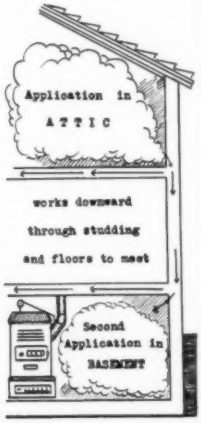

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The Control of Wood Decay

(Continued from Page 21)

tructive fungi, rainfall and temperature in the particular region where construction is contemplated. Wood into which a preservative has been injected or construction material other than wood may be used for parts of construction in which the probability of decay is significant.

4. Provide cross ventilation in basements and beneath buildings lacking basements in order to prevent moisture condensation or the accumulation of moisture from the air.

5. Prevent moisture from collecting through loose joints on the exterior of structures. Wooden corners of buildings are particularly vulnerable spots, as is woodwork around doors, windows and porches.

6. Protect all exteriors with paint, making sure that only dried wood is painted and not permitted to check.

7. Protect wood interiors of buildings as well as exteriors against decay fungi. Moisture condensation from cold-water pipes, etc., is often encountered and specific provisions for avoiding decay associated with increased moisture content of wood from this source may be required.

At all times during construction or remodeling, provide for adequate sanitary conditions with relation to scrap material. Do not permit debris which might serve as a "nest egg" of decay fungi to accumulate within basements or about foundations or other places in contact with the ground or moisture.

V. Current Problems.

In view of the waste resulting from the abuse of wood, it appears that every organization which concerns itself with the use and preservation of wood products may well consider seriously the many problems which confront all wood users as a result of current emergencies. An almost endless list of specific current problems could be included for further consideration, but in the interest of brevity let this discussion end with individual opinions on the following lead topics:

1. Building boom.

2. Minimum of quality construction.

3. Decay prevention practices ignored in hasty construction.

4. Widespread use of untreated lumber.

5. Hurricane wood.

6. Priorities in wood preservation.

7. Wood preservation as basic national defense.

VI. Sources of Information on the Control of Wood Decay Fungi.

Reference Books

Boyce, J. S.—Forest Pathology—American Forestry Series. N. Y., 1938.

Brown, N. C.—Forest Products, Their Manufacture and Use. N. Y., 1919.

Hubert, E. E.—Outline of Forest Pathology. N. Y., 1931.

Hunt, G. M., and Garratt, G. A.—Wood Preservation. N. Y., 1938.

Weiss, H. F.—Preservation of Structural Timber. N. Y., 1916.

U. S. Department of Agriculture

Publications obtainable at prices (stamps will not be accepted as payment) indicated from:

Superintendent of Documents
Government Printing Office
Washington, D. C.

Farmers' Bulletins

744 F.—The Preservation of Farm Timbers. 5c.

1660 F.—The Use of Logs and Poles in Farm Construction. 5c.

1756 F.—Selection of Lumber for Farm and Home Building. 5c.

Circulars:

128 C.—Effectiveness of Moisture-Excluding Coatings on Wood. 5c.

163 C.—Manufacture of Dimension Stock from Northern Hardwoods. 15c.

239 C.—Moisture Content of Wood in Dwellings. 5c.

489 C.—Selection, Installation, Finish, and Maintenance of Wood Floors for Dwellings. 5c.

Department Bulletins:

286 D.—Strength Tests of Structural Timbers Treated by Commercial Wood-Preserving Processes. 5c.

510 D.—Timber Storage Conditions in the Eastern and Southern States With Reference to Decay Problems. 25c.

871 D.—The Dry-Rot of Incense Cedar. 15c.

1136 D.—Kiln Drying Handbook. 30c.

1262 D.—Effect of Kiln Drying, Steaming, and Air Seasoning on Certain Fungi in Wood. 10c.

1500 D.—The Gluing of Wood. 25c.

Miscellaneous Publications:

224 MP.—Manual on Preservative Treatment of Wood by Pressure. 15c.

358 MP.—Use and Abuse of Wood in House Construction. 10c.

Technical Bulletins:

104 T. — Deterioration of Wind-Thrown Timber on the Olympic Peninsula, Wash. 10c.

158 T.—Comparative Strength Properties of Woods Grown in the United States. 5c.

165 T.—The Kiln Drying of Southern Yellow Pine Lumber. 20c.

168 T.—The Application of Silviculture in Controlling the Specific Gravity of Wood. 15c.

174 T.—The Air-Seasoning of Wood. 35c.

282 T.—Strength - Moisture Relations for Wood. 20c.

285 T.—Properties of Western Larch and Their Relation to Uses of the Wood. 35c.

286 T.—Decay and Other Losses in Douglas Fir in Western Oregon and Washington. 20c.

305 T.—The Strength and Related Properties of Redwood. 10c.

332 T.—The Bearing Strength of Wood under Bolts. 5c.

408 T.—Properties of White Fir and Their Relation to the Manufacture and Uses of the Wood. 10c.

479 T.—Strength and Related Properties of Woods Grown in the United States. 25c.

494 T.—Decay Following Fire in Young Mississippi Delta Hardwoods. 5c.

527 T.—Progressive Effect of **Polyporus versicolor** on the Physical and Chemical Properties of Red Gum Sapwood. 10c.

570 T.—Decay in Merchantable Oak, Yellow Poplar, and Basswood in the Appalachian Region. 5c.

691 T.—The Glued Laminated Wooden Arch. 20c.

Periodicals on Lumber

American Lumberman—American Lumberman, Inc., 431 S. Dearborn St., Chicago.

British Columbian Lumberman: Recognized authority on sawmilling, shingle manufacturing, timber-holding, logging, woodworking and paper and pulp industries of B. C. The B. C. Timber Industries Journal, Ltd. Publ. 605 Metropolitan Bldg., Vancouver, B. C.

Canada Lumberman: Hugh C. MacLean Publications, Ltd., 347 Adelaid St. W., Toronto, Ontario.

Four L. Lumber News (in newspaper form): Loyal Legion of Loggers and Lumbermen, 500 Concord Bldg., Portland, Ore.

Hardwood Record: A publication devoted exclusively to establishing contact between the production, distribution and consumption of hardwood lumber, dimensions, plywoods, and veneers. Hardwood Co., 537 S. Dearborn St., Chicago.

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New York Lumber Trade Journal: N. Y. Lumber Trade Journal Inc., 285 Madison Avenue, New York, N. Y.

Southern Lumber Journal: Southern Lumber Journal Inc., Publisher, Jacksonville, Fla.

Southern Lumberman: J. H. Baird Publishing Co., 917 Berryhill St., Nashville, Tenn.

Timberman (Sawmill Engineering Conference): George M. Cornwall, Editor and Publisher, 623 S. W. Oak St., Portland, Ore.

Tropical Woods (Yale University School of Forestry): 205 Prospect Street, New Haven, Conn.

West Coast Lumberman: Miller-Freeman Publications, 71 Columbia St., Seattle, Wash.

Wood Construction; the Lumber Forum of Central States: Wood Construction Pub. Co., Xenia, Ohio.

Periodicals on Woodwork.

Canadian Woodworker and Furniture Manufacturer: Hugh MacLean Publications, Inc., 347 Adelaide St. W., Toronto Ontario.

Industrial Finishing; Devoted to Product Finishing in the Factory: Practical Publications, Inc., 222 E. Ohio St., Indianapolis, Ind.

Wood Preserving News: American Wood Preservers' Association, Service Bureau, 111 Washington St., Chicago.

Veneers and Plywood; a Journal for Veneer and Plywood Manufacturers and Users: S. H. Smith Co., Inc., 2232 N. Meridian St., Indianapolis, Ind.

Wood Products: National Magazine of Wood Working Industry. Lumber Buyers Pub. Co., 431 S. Dearborn St., Chicago.

Wood-Worker: Devoted to Production Methods in Wood-Working Plants. S. H. Smith Co., Inc., 2232 N. Meridian St., Indianapolis, Ind.

Silly, but It's So

Hana Karol and Martha Jones, a pair of misses aiming at footlight fame, share a room in midtown. Hana has done two minor roles, but the past four months have been starvation times. And Martha has just been trying. Last week the girls were roused from their somber thoughts when they observed an insect on the wall. They did not have the nerve to destroy it themselves, so Hana dabbed paste on the corners of a sheet of paper and imprisoned the insect alive. Then Hana ran into the street to get help. The first man she met was Ben Boyar, the producer, who obliged and exterminated the demon. Result: Hana reads a part for a new play for Boyar tomorrow!

—From George Ross' column—New York World-Telegram.

Minnows Wage War on Malaria Mosquito

Melbourne—Minnows are being used in Australia to combat malaria, Army Minister Francis M. Forde announced recently.

The tiny fish are released in ponds and pools, where they feed on larvae of mosquitoes which spread the disease. Forde said that the malaria rate among Australians in the Northern Territory is remarkably low.

—New York Times.

New Books

Entomology of the Insects and Myriapods

By OSKAR A. JOHANNSEN, Professor of Entomology, Emeritus and FERDINAND H. BUTT, Instructor of Insect Morphology, Embryology, and Histology, Cornell University

461 pages, 6 x 9, illustrated, $5.00
McGraw-Hill Publications in the Zoological Sciences

Here is a book that fills the need for an authoritative text in English dealing exclusively with the developmental history of insects, centipedes, and millepedes, from egg deposition to hatching.

The first part of the book is a comparative study of the development of tissues and organs of insects, centipedes, and millepedes. Controversial questions and theories are dealt with impartially. In the second part the embryonic history of a number of insects representing most of the orders is described, with emphasis upon the more characteristic features of the development of each type. Recent advances with respect to various phases of developmental processes receive special attention.

The approach to the subject differs from the usual one in that a second part has been added which gives examples of developmental types from each of the major orders of Eutracheata.

Strictly up to date, the text includes such subjects as polyembryony, symbiotic organisms in the egg, and experimental embryology.

CHAPTER HEADINGS

Part I

A Type of Embryonic Development in Insects
The Egg, Fertilization, Maturation, and Cleavage
Early Development
Embryonic Envelopes, Dorsal Organs, and Blastokinesis
Gastrulation, Formation of the Germ Layers and Development of the Entoderm
The Alimentary Canal
Ectodermal Derivatives
Mesodermal Derivatives
Polyembryony and Parthenogenesis
Micro-organisms in the Egg
Experimental Embryology

Part II

Oligoentomata and Aptilota
Ephemerida, Odonata, Plecoptera. Embiaria, Dermaptera, Hemimerina
Orthopteroidea (Panorthoptera)
Oligonephridia
Neuroptera and Celeoptera
Hymenoptera
Trichoptera and Lepidoptera
Siphonaptera and Diptera

Entomophagous Insects

By CURTIS P. CLAUSEN
Principal Entomologist, in Charge Division of Foreign Parasite Introduction, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture

688 pages, 6 x 9, 257 illustrations, $7.00

This book gives an account of the range of host preferences, habits, and immature stages within each family and compares these with related families. It brings together from many sources not only the general habits of each group but the departures from the normal.

One feature which is emphasized throughout is the exceptionally wide range in habits, and in the form of immature stages, which occurs even within small groups. These are largely adaptations to meet various conditions imposed as a result of the form or habits of the host insects themselves. Thus in the discussion of the biology and habits of the entomophagous insects, particular attention has been given to those groups which reveal a high degree of specialization in their host relationships and in the form of the immature stages to adapt themselves to this mode of life. The generalized predators are dealt with only at such length as to illustrate the host preferences and habits of each group.

Covers some 200 entomophagous insect families under the following orders: Hymenoptera, Diptera, Lepidoptera, Strepsiptera, Coleoptera, Hemiptera, Thysanoptera, Trichoptera, Mecoptera, Plecoptera, Neuroptera, Odonata, Corrodentia, Orthoptera, Dermaptera, Thysanura.

Insect Pests

By WILLIAM CLUNIE HARVEY, M. D. and HARRY HILL

The extermination of insect pests is no longer governed by haphazard, empirical procedure, but is a skilled science requiring the employment of rigid methods and of persons possessing considerable technical knowledge.

During recent years, the study of insect pests has received an increasing degree of attention, which is in every way justified when the effects produced by this type of nuisance is taken into consideration. This has resulted in benefit to the community. The foundation of successful vermin destruction is an accurate knowledge of the habits, life history and environment of the insect in question. It is only when this problem has been properly tackled and thoroughly understood that the chemical and mechanical means of combating pests can be utilized.

The authors have assembled a vast fund of practical information within the confines of a small handbook, which should be of great value to those who are called upon to play some part in insect control during the present emergency. Now when so many thousands of our men are brought together in training quarters, that which was formerly considered a nuisance has finally been recognized as a definite menace. Every war introduces problems in this particular line of activity and the authors have kept this fact before them in preparation of the material for INSECT PESTS. Because of this view point, this book is of special importance at this time.

Part I deals with Insect Pests, including the bed-bug, the flea, the louse and other vermin. Part II is devoted to the Principles and Practice of Disinfestation, including building construction and infestation, gaseous fumigants, technic of fumigation, educational measures for insect control, legislative control, human toxicology, and the disinfestation of foodstuffs and ships. There are two appendices containing forms and records and specimen propaganda leaflets; the book is well indexed and is attractively printed and bound.

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ROTENONE INSECTICIDES DERRIS—TIMBO—CUBE

Booklet discusses Rotenone Roots as insecticides; reminiscent and romantic; development of derris root as an insecticide; is Derris poisonous to man or animal; do Derris, Cube and Timbo deteriorate when exposed to light and air; assay method for rotenone; powdered Derris root; INSECT CONTROL CHART; rotenone added to Pyrethrum sprays, etc.

WRITE PESTS c/o Penick.

TEST FOR PRESENCE OF HCN

Bulletin describes one more aid for the pest control operator in the interest of safe fumigation practice. It suggests the use of methyl-orange test papers as an aid in determining whether or not a fumigated space has been entirely cleared of HCN. These are small strips of paper of a canary yellow which, in the presence of an atmosphere containing HCN turn pink or red and are very sensitive to relatively low concentrations of the gas, though it should be distinctly understood that the use of these test papers is merely an aid in determining when a place is safe for occupancy. Their use does not eliminate the other customary precautions in fumigations. Moreover, it should be remembered that chemical indicators of this type are not infallible. Formula sheet giving color chart and other pertinent data will be sent so long as supply lasts. WRITE PESTS—Bulletin No. 55.

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The formulas are those used in commercial concerns and have been collected through the efforts of a board of editors of 45 outstanding chemists. These editors, most of whom are connected with commercial firms, experiment stations or American colleges and universities, add considerable authority to the book.

The ground covered in this volume is more comprehensive than that of any previous one and the editor has done an excellent job in this compilation. In a ready reference and brief form he has placed before the layman as well as before the specialist, much information that might otherwise necessitate a great deal of time to ferret out.

The book is not one of formulas alone, but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. The fact that many practicing chemists engaged in one field of work are not familiar with the formulas in another field, and that much study and practice must go into compiling unfamiliar formulas makes this volume a ready source book of information.

Of special interest to the readers of this journal would be the chapter devoted to FARM AND GARDEN SPECIALTIES. In addition to these subjects the following are discussed in great detail: ADHESIVES, BEVERAGES, COSMETICS AND DRUGS, EMULSIONS AND DISPERSIONS, TEXTILES, FIBRE, SOAPS, CLEANERS, FOOD, INKS, LEATHER, SKINS, FURS, LUBRICANTS, OILS, FATS, MATERIALS OF CONSTRUCTION, METAL AND METAL TREATMENT, PAINTS, ENAMELS, VARNISHES, LACQUERS, PAPER, PHOTOGRAPHY, POLISHES, PYRO-TECHNIQUES AND EXPLOSIVES, RUBBER, RESINS, PLASTICS, WAXES, MISCELLANEOUS.

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This book discusses primarily the problem of preservation of shade trees from insect pests also describing accepted methods of fertilizing shade trees. It is intended for pest control operators engaged in the business of treating and caring for shade trees, and for all others interested in preserving shade trees. The book discusses in detail all the important insect enemies of shade trees east of the Rocky Mountains, and most of those on the Pacific coast. The book is illustrated with 350 photographs and drawings. Contains 417 pages. **Price, $5.00.**

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